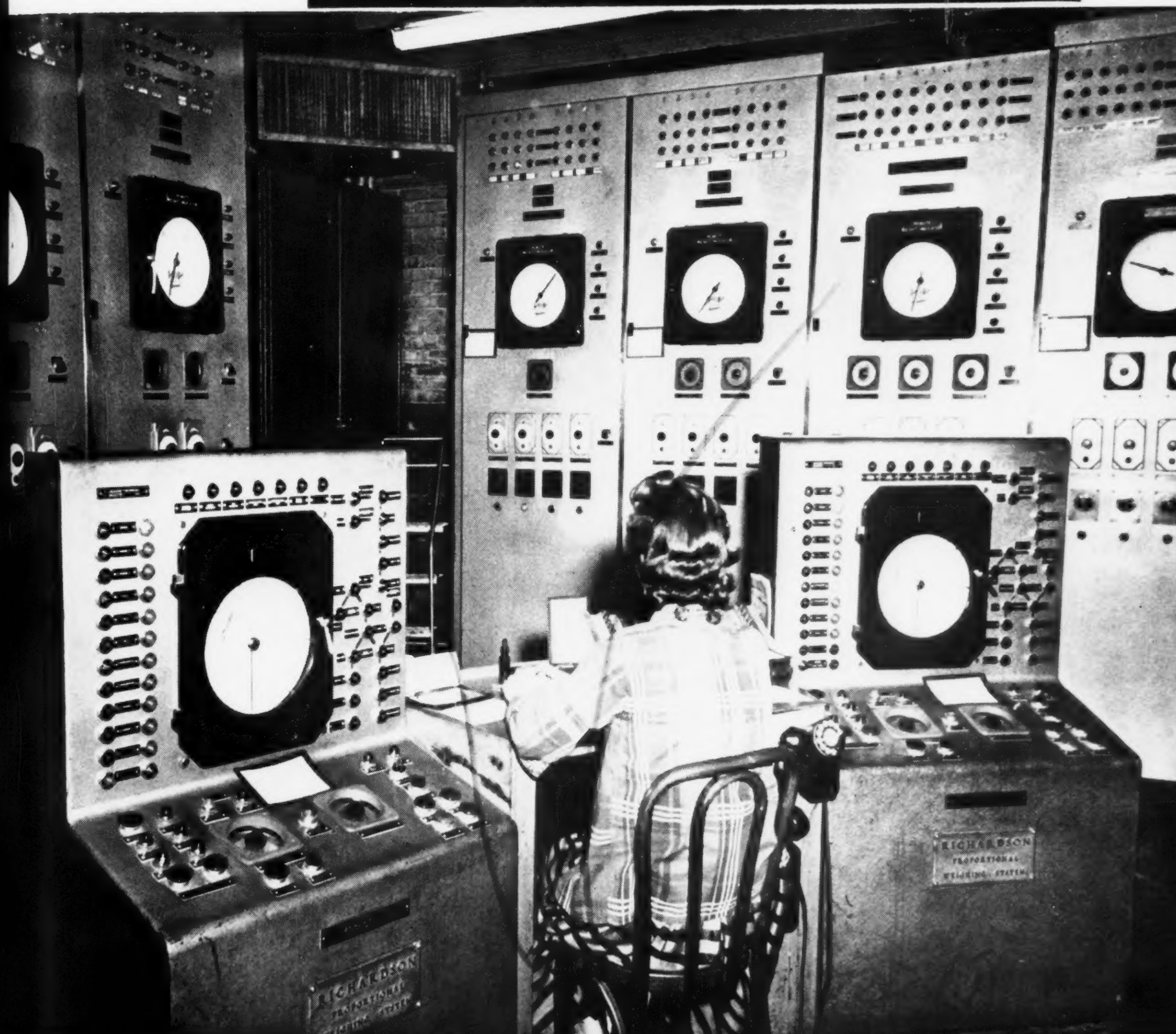
NE, 1955

RUBBER WORLD

NOW IN ITS 66th YEAR



BILL BROTHERS
BLICATION

STATUS OF AUTOMATION IN THE RUBBER INDUSTRY

see page 339

RUBBER WORLD, June, 1955, Vol. 132, No. 3. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada, $6.00; All other countries $7.00; Single Copies 50 cents. Address Mail to N. Y. Office.

New Recipes for Better Rubber Products from PHILBLACK® Research!

"Some like it hot . . . some like it cold!" Rubber, one of the most versatile of materials, can be compounded to provide widely varying characteristics. Some manufacturers need high hot tensile . . . others are more concerned with hysteresis. Still others must have hardness, abrasion resistance, good electrical conductivity, processability . . . or combination of these qualities. What are *your* specific requirements?

Whatever your needs, Philblack can help. The four Philblacks, each with its individual characteristics, give desirable adaptability in rubber recipes.

For years Phillips experts have been working with carbon blacks and rubber, trying different recipes to achieve specified results . . . checking the effects of aging, abrasion and flexing on rubber products . . . discovering and improving methods of processing.

This backlog of knowledge is available to Phillips customers. For full information about the Philblacks and for expert, practical advice on your special problems, consult your Philblack representative.

Know the Philblacks! KNOW WHAT THEY'LL DO FOR YOU!

A — **Philblack A FEF Fast Extrusion Furnace Black**
Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.

I — **Philblack I ISAF Intermediate Super Abrasion Furnace Black**
Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.

O — **Philblack O HAF High Abrasion Furnace Black**
For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.

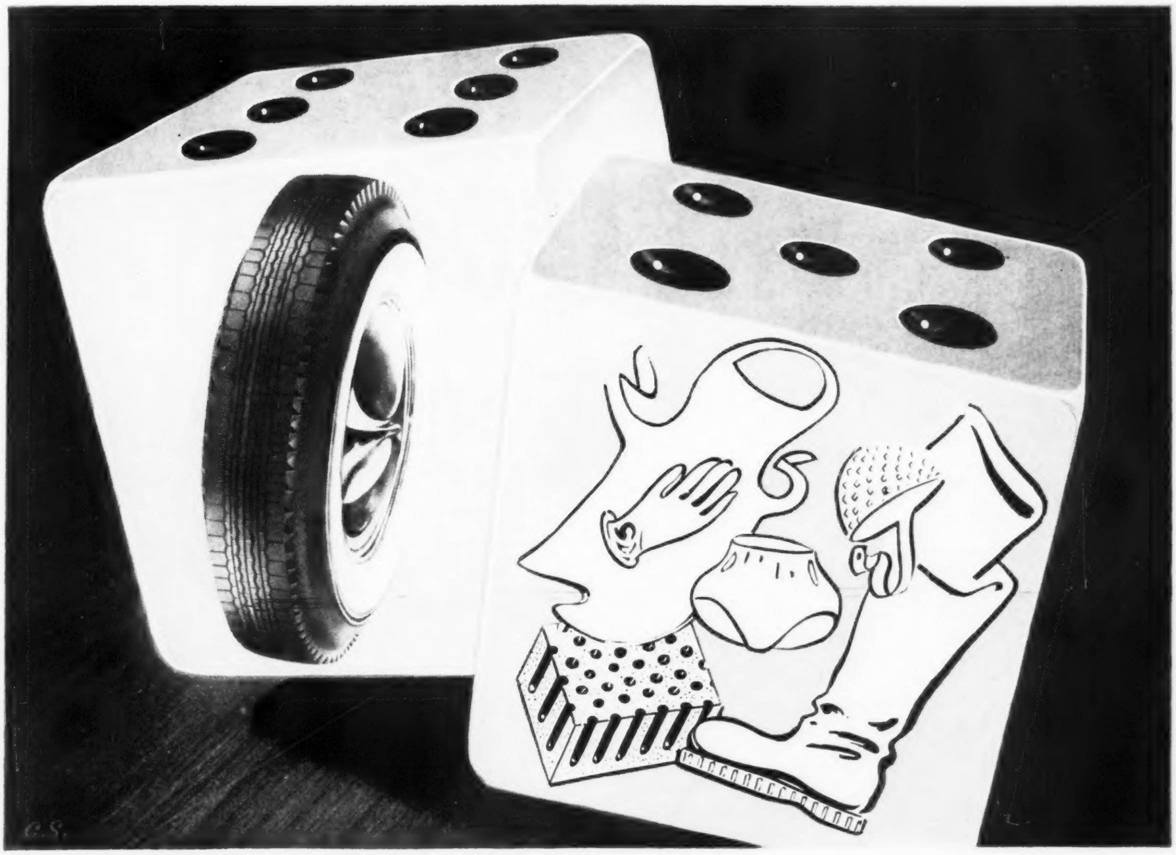
E — **Philblack E SAF Super Abrasion Furnace Black**
Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.

Phillips 66

PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y. West Coast: Harwick Standard Chemical Company, Los Angeles, California. Canada: H. L. Blachford, Ltd., Montreal and Toronto.

POLYGARD
chemical stabilizer for GR-S

A NATURAL...



for keeping White rubber **WHITE** • Light rubber **LIGHT**

POLYGARD® is a chemical stabilizer for *nonstaining* and *nondiscoloring* GR-S. It *keeps* light rubber light—gives *superior* color stability to your product.

Specifically designed to prevent staining and discoloring, POLYGARD gives excellent resistance to aging. It also prevents viscosity changes and gel increase during drying and high temperature processing.

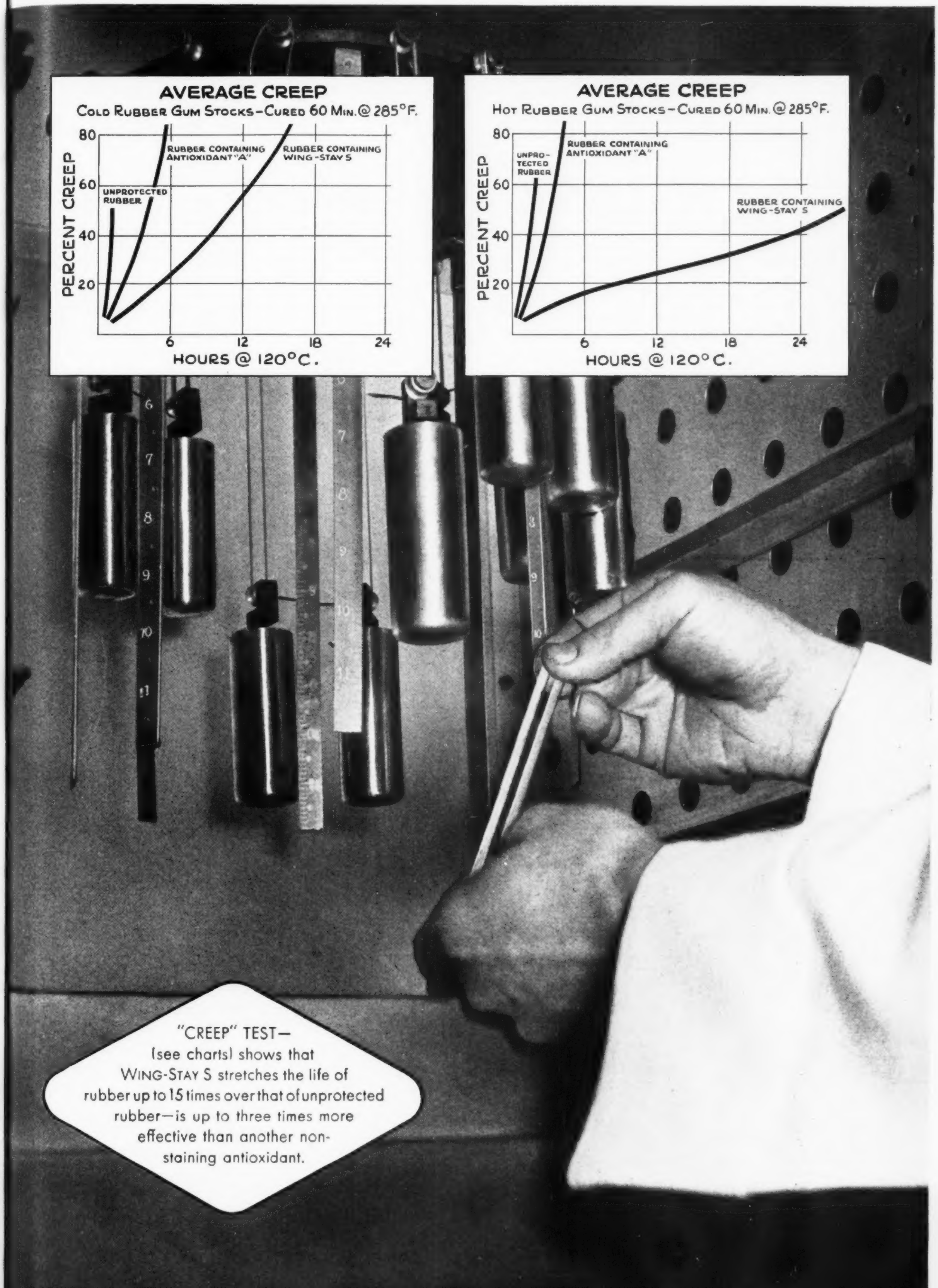
POLYGARD stabilized polymers are used for whitewall tires, shoe soling, tiling, hospital sheeting, sponge rubber, wire insulation, and many other products. Since POLYGARD stabilized GR-S rubber is fully equivalent to staining type GR-S you can *now* use nonstaining GR-S in both white and black sidewall tires as well as in other products across the board.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • **IN CANADA:** Naugatuck Chemicals, Elmira, Ontario
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.

WING-STAY S—another quality product of Goodyear Chemical Division



for the BEST...
in rubber and plastics
LOOK TO MUEHLSTEIN
For example — CRUDE RUBBER
For the best crude rubber connections in the world—look to Muehlstein! Muehlstein, with central offices in New York and London *and* direct agents in every corner of the globe provides a constant flow of information on the best crude rubber offerings. Simply contact any Muehlstein office.
You'll also find Muehlstein helpful on all types of Synthetic Rubber. A complete technical staff and laboratory facilities are available through home or regional offices.
And remember, other Muehlstein products include: REPROCESSED PLASTICS • SCRAP RUBBER HARD RUBBER DUST • SYNTHETIC RUBBER
MUEHLSTEIN & CO. INC.
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CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCR
REGIONAL OFFICES: Akron · Chicago · Boston · Los Angeles · London · Toront
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Facts You Should Know About National Aniline's Commercial Production of Tolylene Di-isocyanates

National NACCONATES*

These simple facts are important to every present and potential user of di-isocyanates:

National Aniline through Allied Chemical resources is basic in every essential raw material needed for the manufacture of di-isocyanates . . . hydrocarbons, nitric and sulphuric acids, hydrogen, chlorine, carbon monoxide, alkalis, aromatic solvents, etc. To our knowledge, no other producer enjoys this advantage.

National Aniline and Allied Chemical experience in phosgene and diamine production spans over 35 years. To our knowledge, no comparable experience exists on the American continent.

We now have commercial-quantity production of Nacconate 80: can furnish other Nacconates for commercial development work (See list below). Additional mass-production plant facilities are now under construction.

Now available for immediate delivery in commercial quantities from Buffalo, N. Y., subject to prior sale:

National NACCONATE 80 Isomeric mixture of 80% 2, 4-tolylene di-isocyanate and 20% 2, 6-tolylene di-isocyanate

Also available for commercial development work:

National NACCONATE 65 Isomeric mixture of 65% 2, 4-tolylene di-isocyanate and 35% 2, 6-tolylene di-isocyanate

National NACCONATE 100 2, 4-tolylene di-isocyanate

National NACCONATE 200 3, 3′ bitolylene 4, 4′-di-isocyanate

National NACCONATE 300 Diphenylmethane 4, 4′-di-isocyanate

We invite inquiries for samples, technical data and quotations.

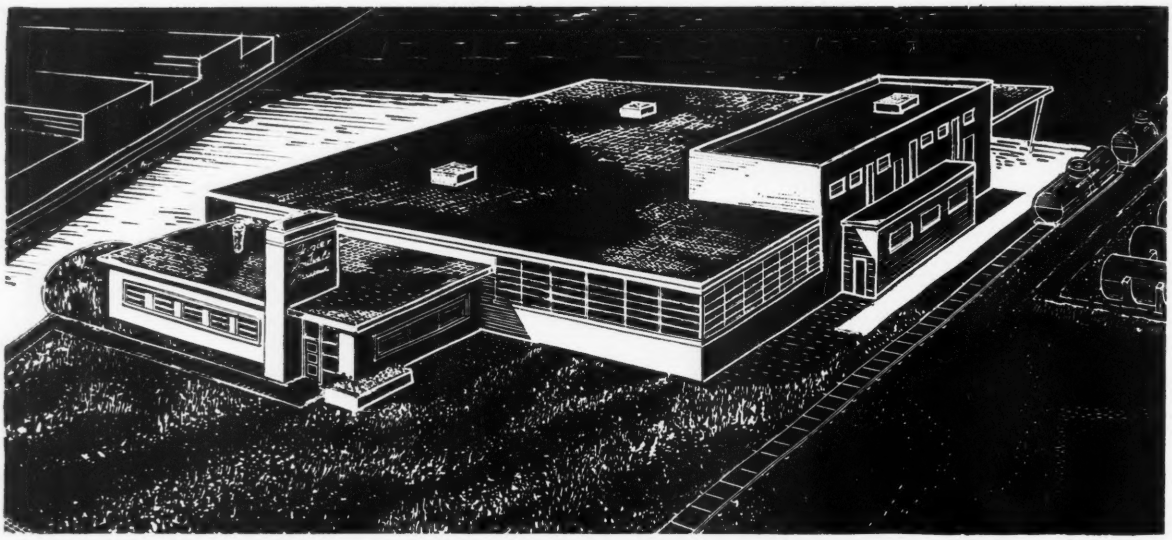
Watch the editorial and advertising pages of this publication for additional information on National NACCONATES

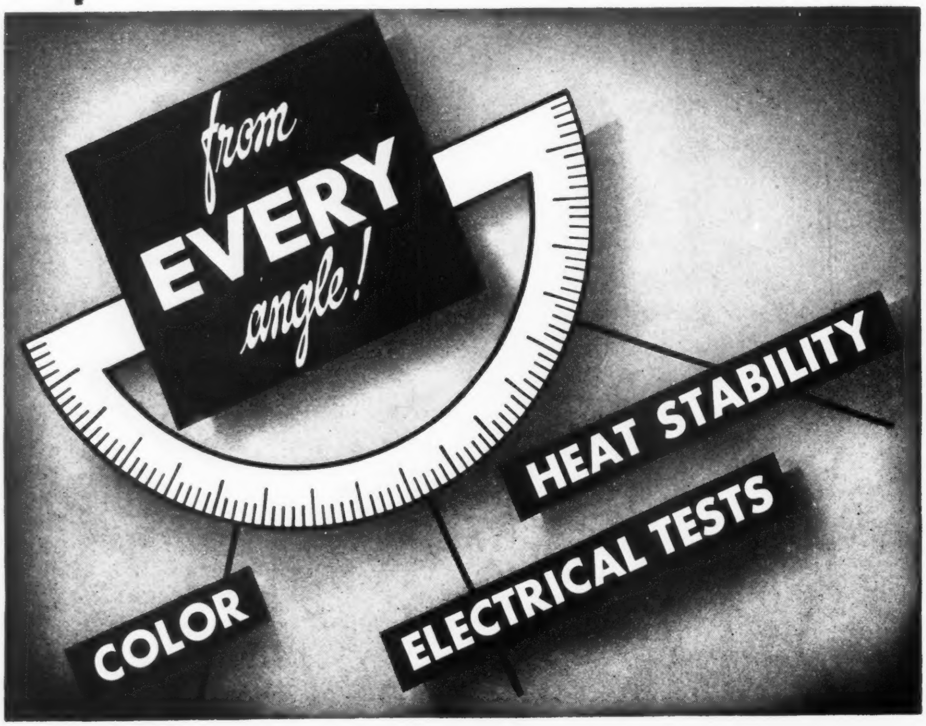
NATIONAL ANILINE DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Allied Chemical

Boston Providence Philadelphia Chicago San Francisco Portland, Ore. Greensboro Charlotte Richmond Atlanta Los Angeles Columbus, Ga. New Orleans Chattanooga Toronto

*TRADE MARK




from
EVERY
angle!
HEAT STABILITY
ELECTRICAL TESTS
COLOR

One Step

MIXING OPERATIONS

and elimination of masterbatching with Superior Processing

NEW

Marbon "8000-A"®

Reinforcing High Styrene Resin

- **FASTER FUSION AT LOWER TEMPERATURES**
- **COOLER MIXING AND IMPROVED DISPERSION**
- **BETTER PIGMENT WETTING**

Recommended especially for scorchy Neoprene and Natural Rubber compounds, and for all open-mill mixing

Marbon "8000-A" resin fluxes rapidly at lower temperatures (165-175 degrees F.) for improved dispersion, shorter mixing cycles, cleaner, brighter colors, faster heat-plasticizing action with lowered power demand.

Marbon "8000-A" is a superior-processing resin with all the reinforcing properties of Marbon 8000. Especially suitable for OPEN MILL mixing under marginal heat conditions, scorchy Neoprene or Natural Rubber compounds.

WRITE *Today* FOR COMPLETE TECHNICAL LITERATURE

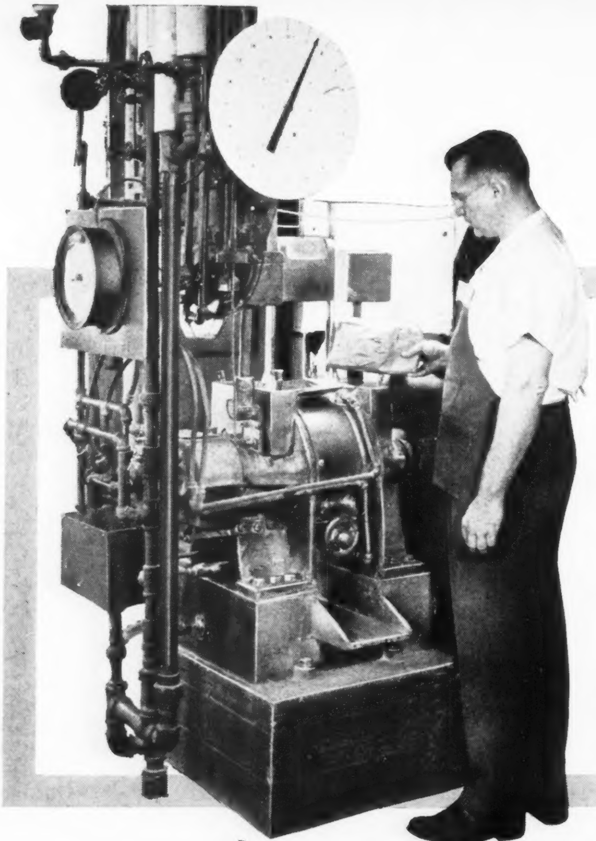
Marbon®

MARBON CHEMICAL

Division of BORG-WARNER

GARY, INDIANA

It BLENDS as it STRENGTHENS as it IMPROVES



need MORE mixing capacity?

...try PROTOX* zinc oxides

You mix faster, turn out more zinc masterbatches per day, with Protox oxides than with conventional oxides.

HERE ARE THE REASONS WHY:

1. *Protox oxides are up to 33% denser.*
In Banbury mixing, they drop to the bottom of the chamber where the rubber can best incorporate them.

2. *Protox oxides are wetted faster by all types of rubbers.*
The zinc propionate coating, exclusively on Protox oxides, enables rubber to displace air quickly from the particles.

3. *Protox oxides disperse faster, more completely.*
Their coating definitely plasticizes the rubber, and increases the affinity of rubber for the particles.

How much can you increase your mixing capacity with Protox zinc oxides? Best way to find out is to take in a trial order now.

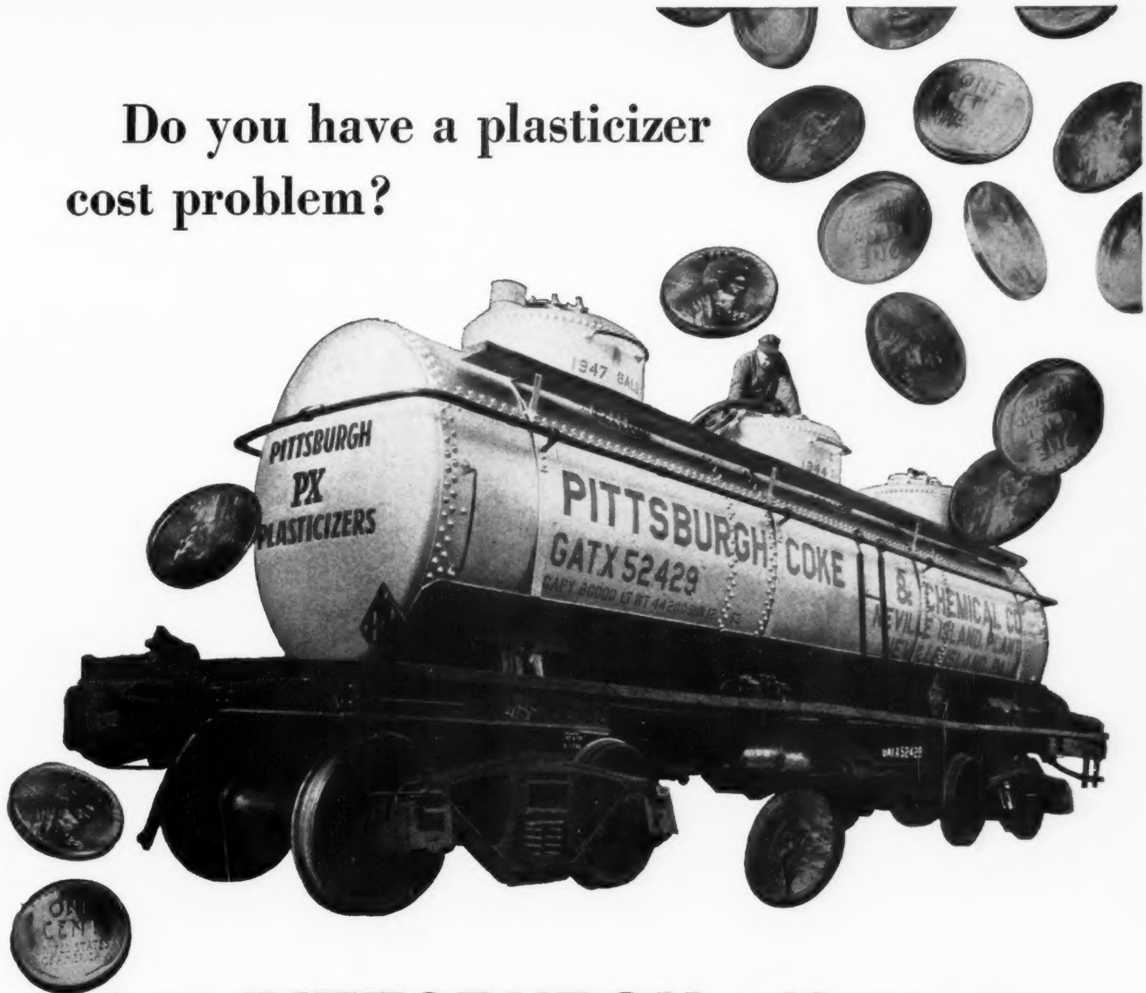
**U. S. Patents 2, 303, 329 and 2, 303, 330*

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments
... most used by rubber manufacturers since 1852
160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

Do you have a plasticizer cost problem?



Let PITTSBURGH offer you some Real Savings

HERE'S a new Pittsburgh development to help you reduce plasticizer costs without sacrificing plasticizer quality. Pittsburgh now offers you a blend of one-third Pittsburgh PX-114 (Decyl Butyl Phthalate) and two-thirds Pittsburgh PX-118 (IsoOctyl Decyl Phthalate). This blend provides almost exactly the same desirable properties as DOP—but at appreciably lower cost.

Pittsburgh Coke & Chemical has developed a number of these blends as a part of its continuing effort to provide you with better plasticizers at lower cost. We'll gladly help you explore the possibility of using blends to improve quality and reduce costs in production at your plant. If such savings are possible, we'll blend to your specifications in tank truck or tank car quantities.

Let's tackle *your* plasticizer cost problems. Call or write us *today!*

LOOK AT THIS PROPERTY COMPARISON

Property comparison below is based on 100 parts resin, 54 parts plasticizer and 3 parts stabilizer in each formulation.

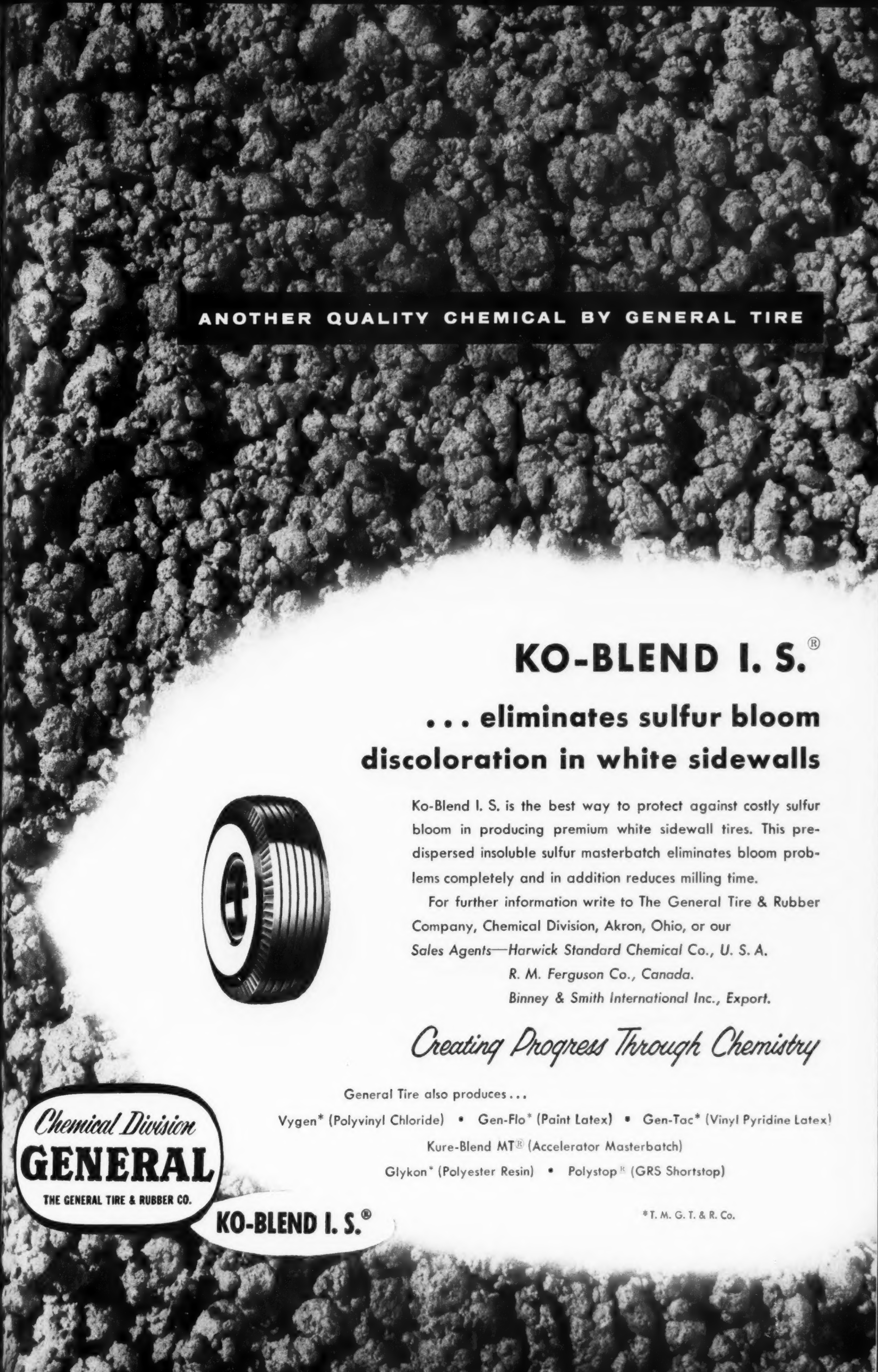
	DOP	⅓-114 ⅔-118
Modulus (100%)	1600	1670
Shore Hardness (10 Sec.)	78	80
Clash-Berg, Tf, oC.	−26°C	−25°C
A. C. Volatility (24 hrs./90°C)	5.0	5.0
Oil Extraction (7 days/25°C)	1.4	1.5
Gasoline Extraction (1 hr./25°C)	14.3%	12.0%
Silicic Acid Test (24 hrs./60°C)	4.5	4.4
Tensile Strength	3100	3050
Ultimate Elongation	370	380

PLASTICIZER DIVISION
PITTSBURGH COKE & CHEMICAL CO.
Grant Building • Pittsburgh 19, Pa.

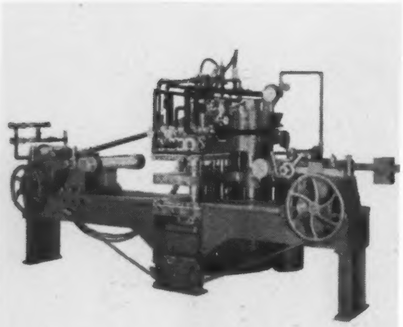
W&D 5494

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON


From friction tape
to conveyor belts...
FABRICS FOR EVERY PURPOSE
Imagine a vast array of fabric sample "swatches" spread over the product out-put and processing materials of the rubber industry and you have a practical idea of the range of fabric constructions available from Wellington Sears.
You'd have to include sturdy cotton and high tenacity rayon belt and hose ducks . . . sheetings . . . chafers . . . filament nylon . . . Army ducks spun rayon and nylon fabrics. These and many other cotton, synthetic and combination fabrics in a variety of weights and widths —all would be represented.
Of course, what you won't see is the variety of fabrics not yet in existence—those we will develop for specific rubber-and-fabric problems of our customers. If you have such a problem, why not let Wellington Sears help you find the answer?
Write us for illustrated booklet "Modern Textiles for Industry."
Wellington Sears
A Subsidiary of West Point Manufacturing Company
FIRST In Fabrics For Industry
For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products



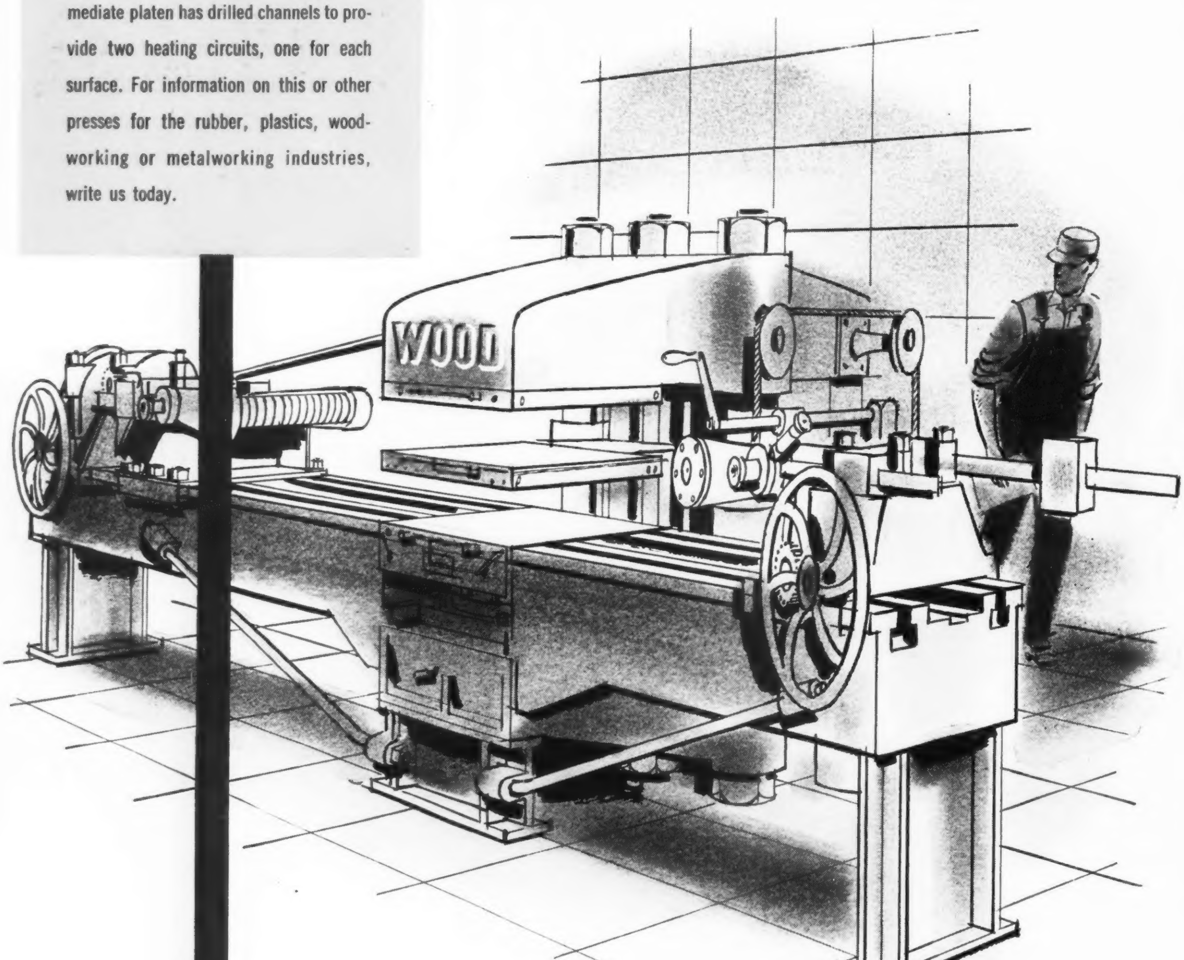
ANOTHER QUALITY CHEMICAL BY GENERAL TIRE
KO-BLEND I. S.®
... eliminates sulfur bloom discoloration in white sidewalls
Ko-Blend I. S. is the best way to protect against costly sulfur bloom in producing premium white sidewall tires. This pre-dispersed insoluble sulfur masterbatch eliminates bloom problems completely and in addition reduces milling time.
For further information write to The General Tire & Rubber Company, Chemical Division, Akron, Ohio, or our
Sales Agents—Harwick Standard Chemical Co., U. S. A.
R. M. Ferguson Co., Canada.
Binney & Smith International Inc., Export.
Creating Progress Through Chemistry
General Tire also produces...
Vygen* (Polyvinyl Chloride) • Gen-Flo* (Paint Latex) • Gen-Tac* (Vinyl Pyridine Latex)
Kure-Blend MT® (Accelerator Masterbatch)
Glykon* (Polyester Resin) • Polystop® (GRS Shortstop)
Chemical Division
GENERAL
THE GENERAL TIRE & RUBBER CO.
KO-BLEND I. S.®
*T. M. G. T. & R. Co.



Open Gap 47-Ton Belt Press for curing flat and V-type transmission belts. The moving platen is accurately machined from a rolled steel slab and is guided by long, full-round babbitted guides on the strain rods. Intermediate platen has drilled channels to provide two heating circuits, one for each surface. For information on this or other presses for the rubber, plastics, woodworking or metalworking industries, write us today.

Prelude to low-cost production

When an R. D. Wood press swings into action, gratifying things happen to production costs. For, in most cases, production climbs to a new high and down-time for repairs approaches zero. The reason is the smooth, dependable performance of R. D. Wood presses—even under difficult conditions. And the reasons for this superior performance are the exacting standards set by R. D. Wood—in design, selection of materials, and craftsmanship. If your company's theme is low-cost production, here is your prelude—ready made.



R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

Representatives in Principal Cities

MAKERS OF HYDRAULIC PRESSES AND VALVES • FIRE HYDRANTS • CAST-IRON PIPE • GATE VALVES • GAS PRODUCERS • ACCUMULATORS

FOR

PLASTISOLS

that give
"PLUS" QUALITIES

in Color Appeal and Service Life *without a "Cost Premium"*

STABELAN HR-50...

This fluid paste stabilizer, specifically developed for Plastisol formulations, contains plasticizer in addition to cadmium and barium with synergized chelating agent. It is suggested for those desiring a single stabilizer that can be readily stirred into Plastisol formulations with minimum mixing and maximum dispersion . . .

Other **STABELANS** also available —

STABELAN E — Paste — For excellent heat and light stability, and long outdoor aging.
STABELAN HR — Paste — A "single package" stabilizer containing cadmium and barium components with synergized chelating agent.
STABELAN HR — Liquid — A synergized chelating agent.
STABELAN HR — Powder — Metal-bearing component of STABELAN HR Paste.

*STANTONE PC Colors...

Pigments flushed or dispersed in a plasticizer to produce a uniform easy working smooth paste. Extra fineness of pigment particle is developed to assure maximum tinting strength . . . Available in a complete line of colors — yellow, orange, red, blue, green, black and white, developed specifically for easy mixing in Plastisol formulations.

*POLYCIZERS (Plasticizers)

— For Every Compounding Requirement:

POLYCIZER DCP—
(Dicapryl Phthalate)
POLYCIZER DBS—(Dibutyl Sebacate)
POLYCIZER DBP—
(Dibutyl Phthalate)
POLYCIZER 162—(Dioctyl Phthalate)
POLYCIZER 332—(Dioctyl Adipate)
POLYCIZER 532—
(Octyl Decyl Adipate)
POLYCIZER 562—
(Octyl Decyl Phthalate)
POLYCIZER 632—(Didecyl Adipate)
POLYCIZER 662—(Didecyl Phthalate)
*CELLUFLEX 179C—
(Tricresyl Phosphate)
*CELLUFLEX 112—
(Diphenyl Cresyl Phosphate)

* Registered U. S. Patent Office

STABELANS are manufactured by Stabelan Chemical Company

Products Courtesy of
Steere Enterprises, Inc.
Akron, Ohio

Write your nearest office for complete data

HARWICK STANDARD CHEMICAL CO.

60 South Seiberling Street, Akron 5, Ohio

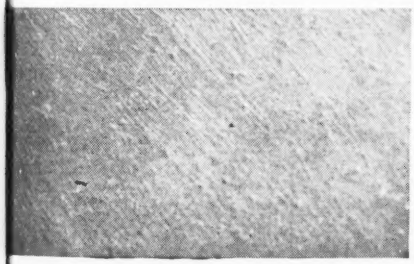
Boston 16, Mass.	Trenton 9, New Jersey	Chicago 25, Illinois	Los Angeles 21, Calif.
661 Boylston Street	2595 E. State Street	2724 W. Lawrence Ave.	1248 Wholesale Street


ST. JOSEPH LEAD COMPANY
ST. JOE
ZINC OXIDE
JOSEPHTOWN, PA.

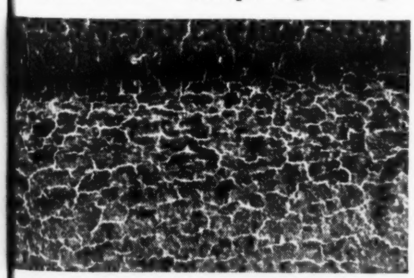
No sign of checking. The rubber insulation on this wire contains Sunoco Anti-Chek. Compare it with the sample at the right.

Surface checking is clearly evident in the rubber covering of this wire—which does not contain Sunoco Anti-Chek.

STOP SURFACE CHECKING AND CRACKING WITH SUNOCO ANTI-CHEK



Sunoco Anti-Chek keeps black sidewalls smooth... even after prolonged storage.



Notice the cracking and checking of the sidewall on this tire which does not contain Sunoco Anti-Chek.

Sunoco Anti-Chek is unique . . . there's no other anti-checking wax like it. It's a narrow-cut primary product, not a blend. It is completely controlled from crude oil to finished product by the same company that originally developed it. And it is made in the most flexible wax plant in the world. To you this means a completely uniform product that can be depended on for the same excellent results tomorrow, next year, 10 years from now!

Detailed information on the many advantages of Sunoco Anti-Chek is given in a new technical bulletin. To get a copy, call your Sun Oil Company representative or write Dept. RW-6.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

"IT'S A *PLEASURE* WORKING WITH DETERO WAX BEADS"

"*I like Detero Wax because—*

IT POURS easily—no messy flakes—will not stick in hot weather or hot mill rooms. Handles much more easily!

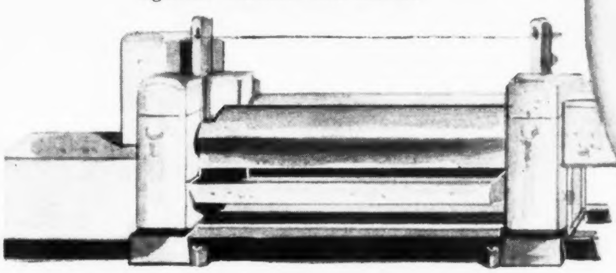
IT MEASURES so easily and quickly—no "approximate" weights!

IT DISPERSES easily and uniformly—cuts mixing time!"

A message to the man who BUYS the wax at your plant:

The man who *uses* DETERO WAX *likes* it because it makes his job easier—*but* DETERO WAX makes the product better, too.

Detero Wax has been tried and tested in rubber formulations, and has been proven to give superior protection against weather and ozone.



Specific wax blends for unusual rubber formulations can be beaded according to your specifications.

Blended DETERO WAX BEADS *speed* and *improve processing* and *improve the product.*

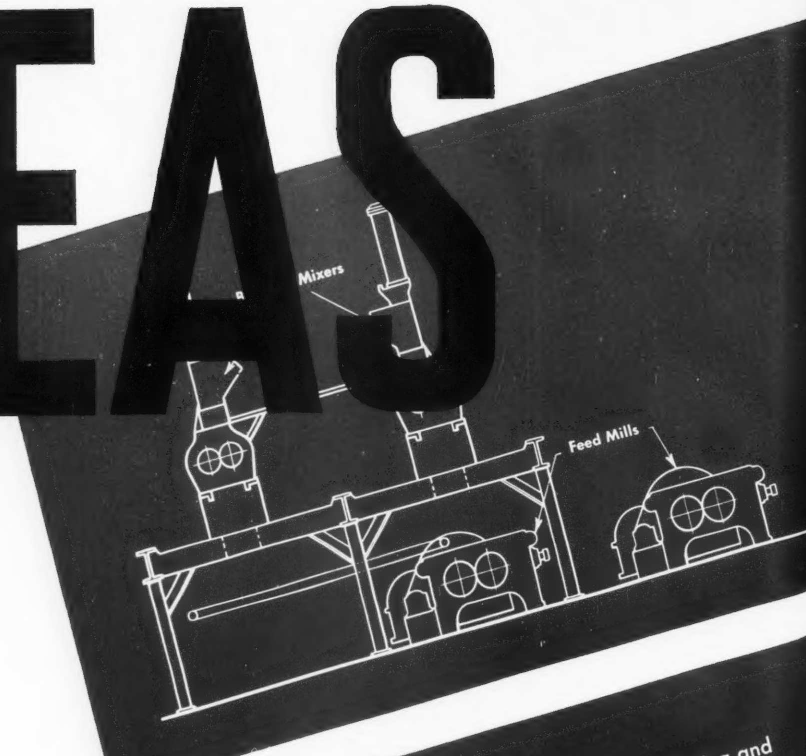
We have also developed special DETERO WAX BEADS for VINYL PLASTICS. LET US WORK WITH YOU—TO *IMPROVE* YOUR PRESENT PRODUCTS or in the DEVELOPMENT OF NEW PRODUCTS FOR SPECIAL REQUIREMENTS OR CONDITIONS.

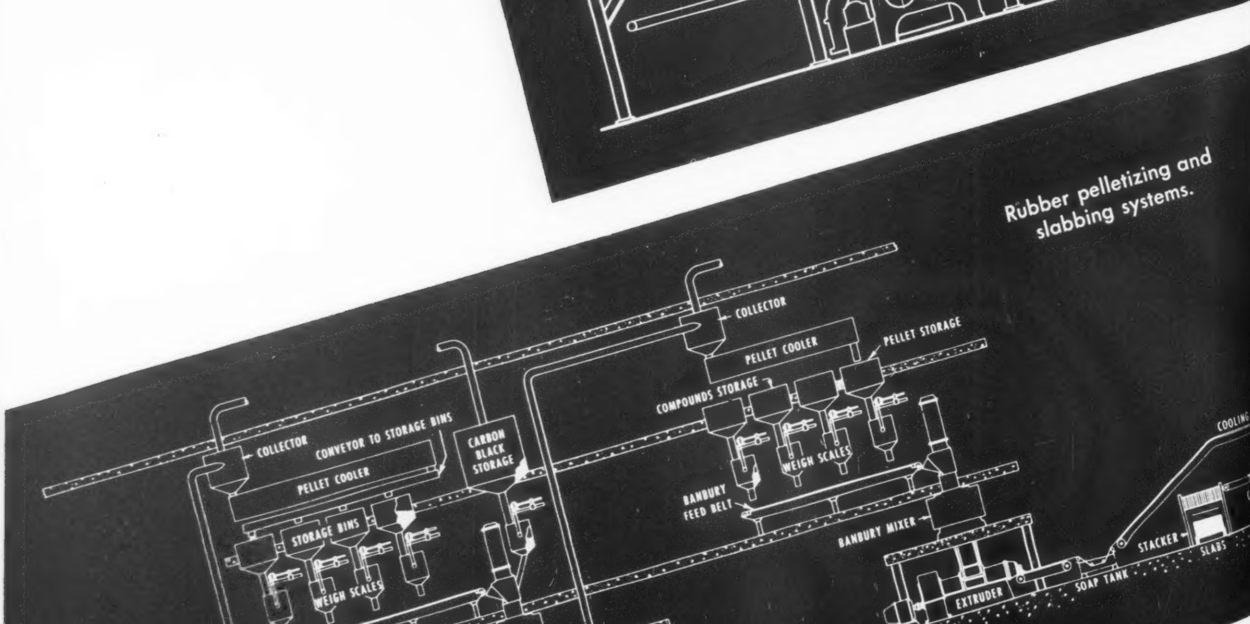
American Maintenance Supply Co.

236 WEST NORTH AVENUE, CHICAGO, ILL.


BROWN POTENTIOMETER
0 10 20 30 40 50 60 70 80 90 100

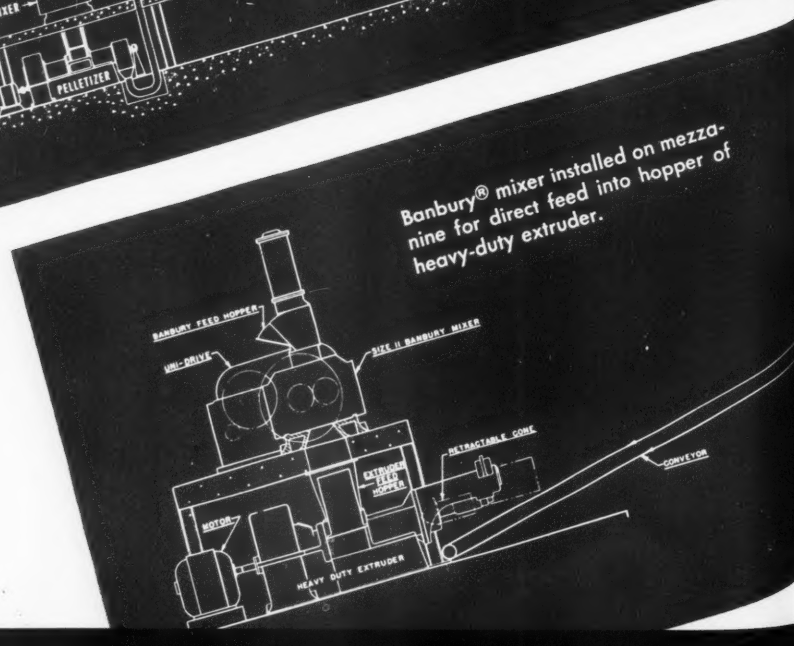
IDEAS

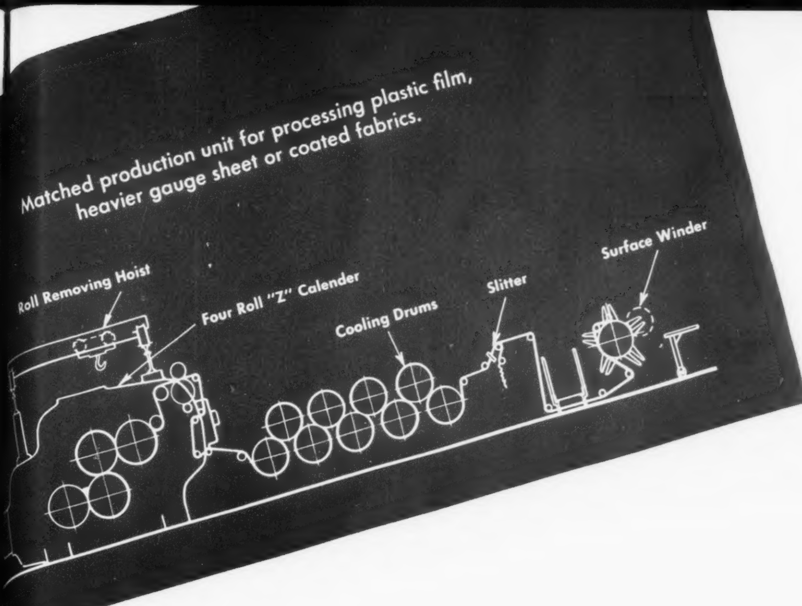




Rubber pelletizing and slabbing systems.

Banbury® mixer installed on mezzanine for direct feed into hopper of heavy-duty extruder.





ARE OUR BASIC PRODUCT

Blueprinted here are four of these "brain products" . . . each designed to assure the most efficient conversion of raw or reclaim materials to finished or semifinished products.

Developed from start to finish by F-B engineers, these setups are composed of production machines matched in capacity to prevent "choking" or "starving" of succeeding units. Production flows without costly interruption. Manual aid and supervision are reduced to a minimum.

No matter how efficient individual production machines may be, their full value can not be realized unless they are components of an overall plan. That's why these "ideas" were developed . . . and why they are so important.

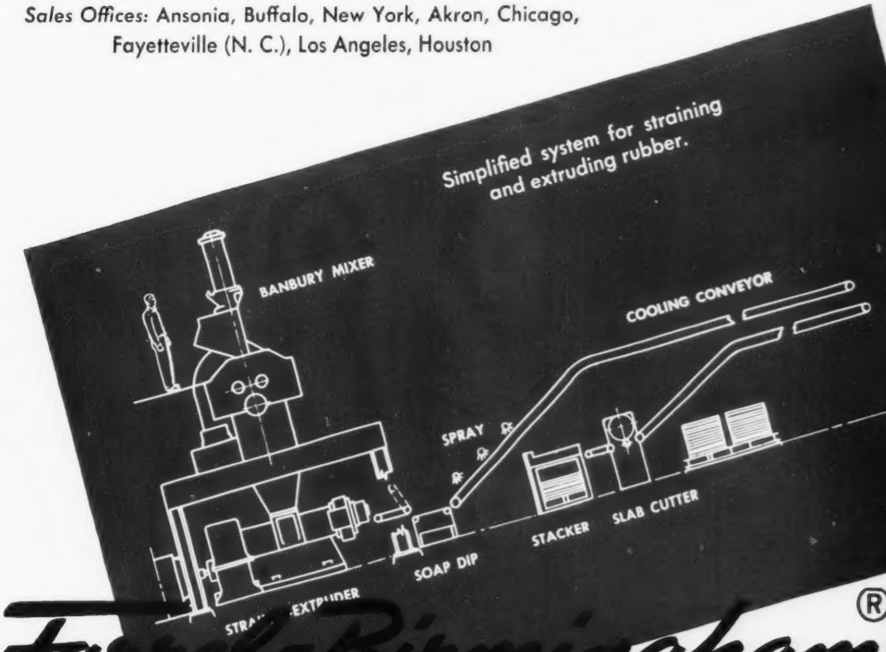
If you are thinking of modernizing or expanding your facilities, Farrel-Birmingham engineers can help you with a production layout to fit your individual needs.

FB-1012

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Fayetteville (N. C.), Los Angeles, Houston

F-B® PRODUCTION UNITS
Banbury Mixers • Plasticators • Pelletizers • Extruders • Calenders • Mixing, Grinding, Warming and Sheeting Mills • Refiners • Crackers • Washers • Hose Machines • Bale Cutters • Hydraulic Presses and Other Equipment for Processing Rubber and Plastic Materials



Farrel-Birmingham ®

How long did it take...

to get from here . . . to here?

Answer: 27 years

Before electric headlights were introduced in 1913, night driving by feeble, undependable light was a hazardous venture. Further research led to the development of today's high-performance sealed beam lights which became standard equipment on 1940 cars.

At the same time, the rubber industry was developing new and better ways to make rubber work harder. Partner in this development is Monsanto with its group of high-performance rubber chemicals which have done—and are still doing—so much to improve tires and other rubber products.

For example, Monsanto Santocure was the original commercially produced sulfenamide type accelerator and with Santocure NS is considered a standard of the rubber industry. Santocure NS has similar behavior in compounded rubbers as Santocure, and is characterized by excellent delayed action which gives greater freedom from scorch. The amount of Santocure NS can generally be reduced about 10% because of its greater strength.

Write today, for your copy of catalog "Chemicals for the Rubber Industry," to MONSANTO CHEMICAL COMPANY, Rubber Chemicals Dept., 920 Brown Street, Akron 11, Ohio.

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICALS FOR THE RUBBER INDUSTRY

ANTIOXIDANTS
- Flectol* H
- Santoflex* DD
- Santoflex 75
- Santoflex AW
- Santowhite* Crystals
- Santowhite MK
- Santowhite L
- Santowhite Powder

MERCAPTO ACCELERATORS
- Santocure* NS
- Santocure
- El-Sixty*
- Mertax (Purified Thiotax)
- Thiotax* (2-Mercaptobenzothiazole)
- Thiofide* [2,2'-dithiobis (benzothiazole)]
- Thiofide S (Seed Form)

ALDEHYDE AMINE ACCELERATORS
- A-32
- A-100

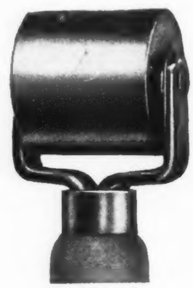
SPECIAL MATERIALS
- Thiocarbanilide ("A-1")
- Santovar*-A
- Sulfasan* R
- Insoluble Sulfur "60"

ULTRA ACCELERATORS FOR LATEX, ETC.
- R-2 Crystals
- RZ-50-A
- RZ-50-B
- Thiurad* (Tetramethyl-thiuram-disulfide)
- Mono Thiurad (Tetramethyl-thiuram-monosulfide)
- Ethyl Thiurad (Tetraethyl-thiuram-disulfide)

GUANIDINE ACCELERATORS
- Diphenylguanidine (D.P.G.)
- Guantal*

COLORS

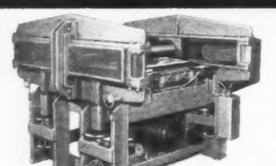
REODORANTS



FLAT FACE

PORCUPINE

STITCHER



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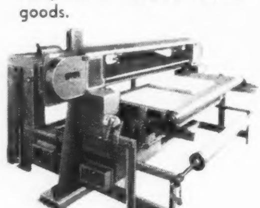

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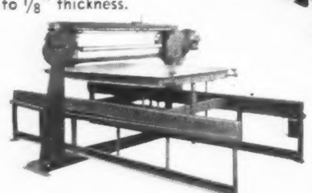

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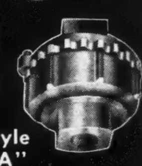

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Cover photograph, courtesy of The Ohio Rubber Co.

RUBBER WORLD

JUNE, 1955

Status of Automation in the Rubber and Plastics Industries[1]

By G. V. KULLGREN
Hale & Kullgren, Inc., Akron, O.

The installation of mechanization and automatic controls in the rubber and plastics industries has been accelerated in recent years under the pressure of keen competition and rising labor costs. Automation also increases with continuous processing.

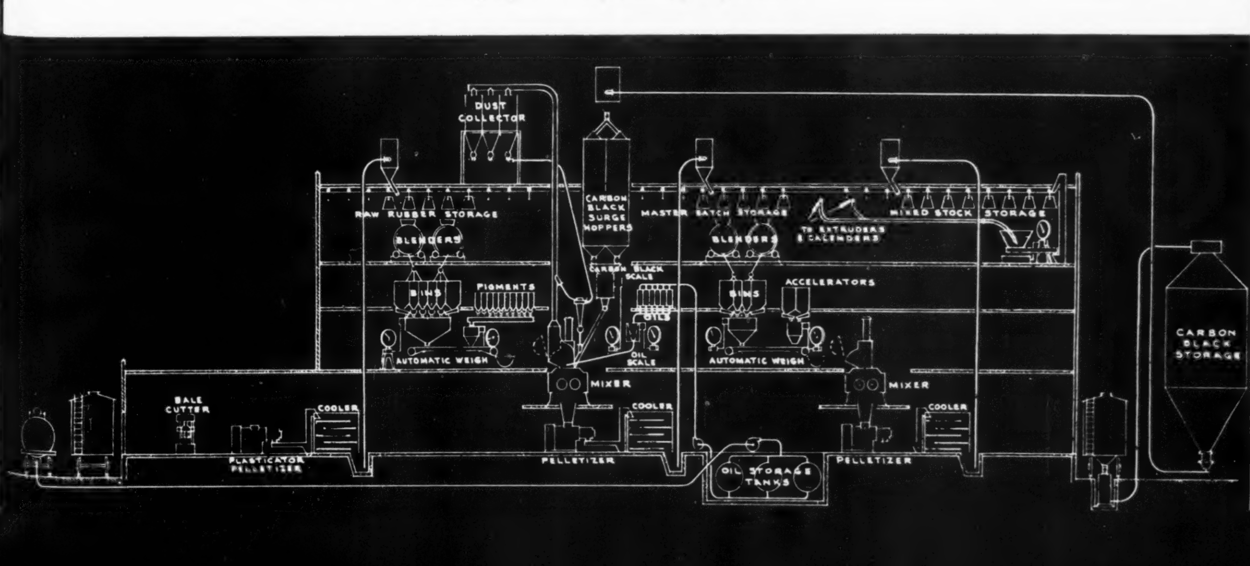
Examples of automation or mechanization in various processes in the rubber industry and to a lesser extent in the plastics industry as well as some comments on future automation possibilities are discussed in this article.

FOR the purpose of this paper automation will be considered as the application of automatic controls to mechanized processes. Mechanization is being developed in many of the processes of the rubber industry, and automatic controls will inevitably follow.

As is the case in many industries, the installation of mechanization and automatic controls in the rubber industry has been accelerated in recent years under the pressure of keen competition and increasing labor costs. As an example, tire plant productivity at the rate of 20 to 25 pounds of finished tires produced per manhour worked in the plant bargaining unit used to be considered acceptable efficiency, but today some tire plants operate above 45 pounds per manhour. A large part of

[1]Presented before the Rubber & Plastics Subcommittee, A.I.E.E., Akron, O., Apr. 4, 1955. See RUBBER WORLD, May 1955, p. 213, for other papers on program which are being published together with this one in booklet form by A.I.E.E., 29 W. 39th St., New York, N.Y.

Fig. 1. Schematic diagram of modern rubber mill room showing mechanization and automation in the bulk handling of carbon black, pelletizing and conveying of raw rubber and mixed stock, and automatic weighing and conveying of compounding ingredients



this gain has been accomplished by mechanization; the balance has been obtained by industrial engineering changes such as job evaluation, methods-time-measurement, and incentive pay plans.

Continuous-flow type of processes is usually more adaptable to automatic controls, and the use of automation will increase as more processes are converted from batch type, "pick it up" and "lay it down" operations.

I will try to recite examples of the installation of automation or mechanization in the various processes of the rubber industry, and to a lesser extent the plastics industry, and also romance a little on future automation which could come about as a result of the economic pressures mentioned previously.

The manufacturing of rubber products can be roughly divided into principal processes as follows: (1) raw material receiving and storage; (2) compounding and mixing; (3) stock preparation: (a) extrusion, (b) calendering; (4) preforming; (5) curing; (6) finishing, assembly, and packing; (7) warehousing and shipping.

Raw Material Receiving and Storage

In the department of raw material receiving and storage, some progress has been made toward eliminating the labor of unloading and transporting to storage. Many of the larger plants have facilities for receiving carbon black in bulk carload lots, using a large multi-compartment tank for storage prior to processing. A typical facility of this type is included in Figure 1. A carbon black storage tank at a Dayton Rubber Co. plant is shown in Figure 2.

Such systems are often found in plants using 15 or more carloads of black per month and usually have capacity for eight to 10 carloads of black. These systems are usually operated from a central control panel and use bucket and belt conveyors for transportation, or in a few cases, air conveyors. Surge tanks, located over the mixers, feed the scale hoppers that in turn discharge into the mixers. Various degrees of automatic controls are used, ranging from manually regulated weighing and dumping up to fully automatic sequence controls.

These systems are fairly expensive; for example, one of this type with a distributing system to handle four Banbury mixers with automatic weighing equipment at the mixers can run in excess of $300,000 installed. Less elaborate systems are now being developed in cooperation with the carbon black manufacturers aimed toward justification by the small and medium sized plant.

Zinc oxide, clay, and other pigments are handled in a similar manner in a few cases where the volume will justify expenditure for a bulk handling system. These and other dry pigments, however, are usually received and stored in drums or bags. These materials are usually dumped manually into bins or hoppers for compounding. Oils and other liquid materials are received in larger plants from tank cars or tank truck into a tank farm and transported to the mixers by means of pumps and heated pipes. This bulk handling system, of course, offers the advantages of minimum contamination and saving of drum expense and some labor.

Ways and means of handling raw rubber in bulk form have been investigated superficially, but will probably be looked into more thoroughly now that the synthetic plants will be privately owned and operated. It might be desirable in some instances to do some of the compounding at the synthetic rubber plant and then ship the compounded rubber in pellet form to the conversion plant, particularly if the material is adaptable to bulk transport. One reclaimer is now shipping reclaim rubber in pellet form by trailer truck, using air conveyors for loading and unloading.

Compounding and Mixing

The process of compounding and mixing offers considerable opportunity for automation in that the work on the rubber is performed mechanically, and it is necessary only to develop the proper transporting means between operations and apply automatic controls. This procedure has been accomplished to a great extent in some plants. The advantages are: (1) uniformity of mixed stock; (2) increased output since productivity is determined by mechanical capacity and not by human capacity; (3) labor saving.

The principal operations in compounding and mixing consist of plastication (for natural rubber), compounding and mixing of a masterbatch (which usually contains all the materials except the curing agents such as sulfur and acceleration), cooling of the masterbatch stock after discharge from the mixer, then final compounding and mixing, cooling, and sheeting of the finished mixed stock prior to storage before calendering or extrusion.

Rubber Breakdown and Handling

Plastication of natural rubber in the larger plants is usually accomplished in a screw-type machine with an output of 7,000 to 10,000 pounds per hour. Hot bales of rubber are delivered to a bale cutter from an oven. The cutter divides the bale into segments small enough to feed properly into the 24-inch screw in the plasticator hopper. Mechanization, proper arrangement of equipment, and the use of some controls permit one man to operate both units. With synthetic rubber it is general practice in some plants to use the plasticator with regular or hot GR-S, but with cold GR-S, plastication is usually done in the Banbury mixer.

In some plants the processing of the stock from raw material storage to finished mixed stock, ready for extruding or calendering, is all mechanized and nearly automatic. Such a system is shown diagramatically in Figure 1. This system requires that all raw materials be served to the Banbury in a form suitable for automatic weighing. At the present time a common way to handle rubber for this purpose is in the form of pellets which requires that all of the raw rubbers be processed through some form of mechanical converter to get them into pellet form.

The most accepted way of converting the raw rubber to pellet form is by the use of the Hale pelletizer head mounted on the delivery end of an extruder-type machine. See Figure 3. As the pellets are discharged from the head, they can be coated with a wet or dry insulator such as soapstone. In the case of natural rubber, this conversion can be combined with the plastication operation.

From the converter the material passes through a cooler and air conveyor into storage. From storage it is

delivered to blenders prior to mixing, as indicated in Figure 1. The methods of cooling, handling, and storing of pellets vary from plant to plant, and rubber being what it is, all of them have had some problems.

Materials Handling and Weighing

Other dry materials such as antioxidants, zinc oxide, resins, etc., are usually received in sacks or drums and loaded into the compounding-system storage hoppers manually. In a system as shown, the Banbury is equipped with an automatic cycle controller which performs the functions of lowering and raising the ram, opening and closing the upper door, opening and closing the discharge door, and operating the feeders which deliver the various materials from the weigh hoppers. Each Banbury is also furnished with automatic scales for weighing the liquid materials and carbon blacks. These materials pass directly from the scale hopper into the mixer in response to signals from the controller. The balance of the materials, including rubbers and dry pigments, are preweighed in a central compounding system which will usually have capacity for serving two or more mixers, depending upon the speed of weighing in relation to Banbury cycle time. It is not uncommon for a weighing system to be able to weigh out and deliver a batch for a #11 Banbury mixer in approximately 45 seconds. If the mixers are operating on overall cycles of 2-2½ minutes, one system can easily take care of two mixers.

In most of the systems in operation today, both the rubber and dry pigment scales are arranged to feed only one mixer, with the transfer of materials from the scale hopper to the Banbury being done by means of a belt. (See Figure 4.) It would seem desirable that in future

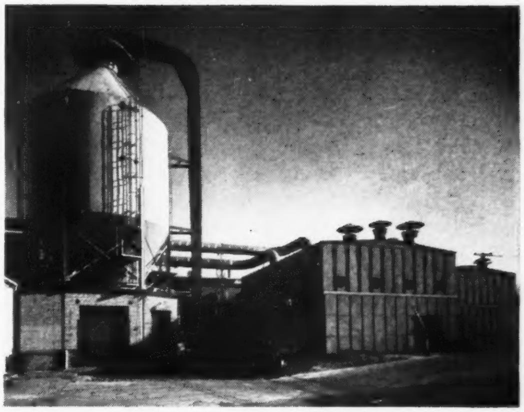


Fig. 2. Multi-compartment carbon black storage tank at a plant of Dayton Rubber Co.

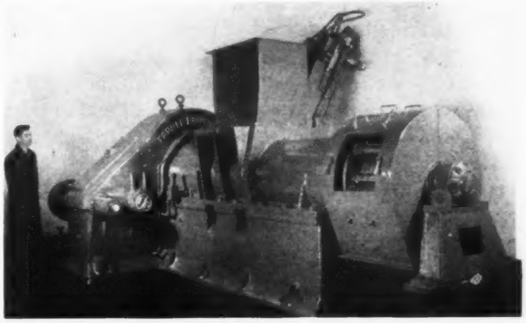


Fig. 3. Extruder-pelletizer with side-delivery head showing cut-off knives for producing pellets of raw rubber

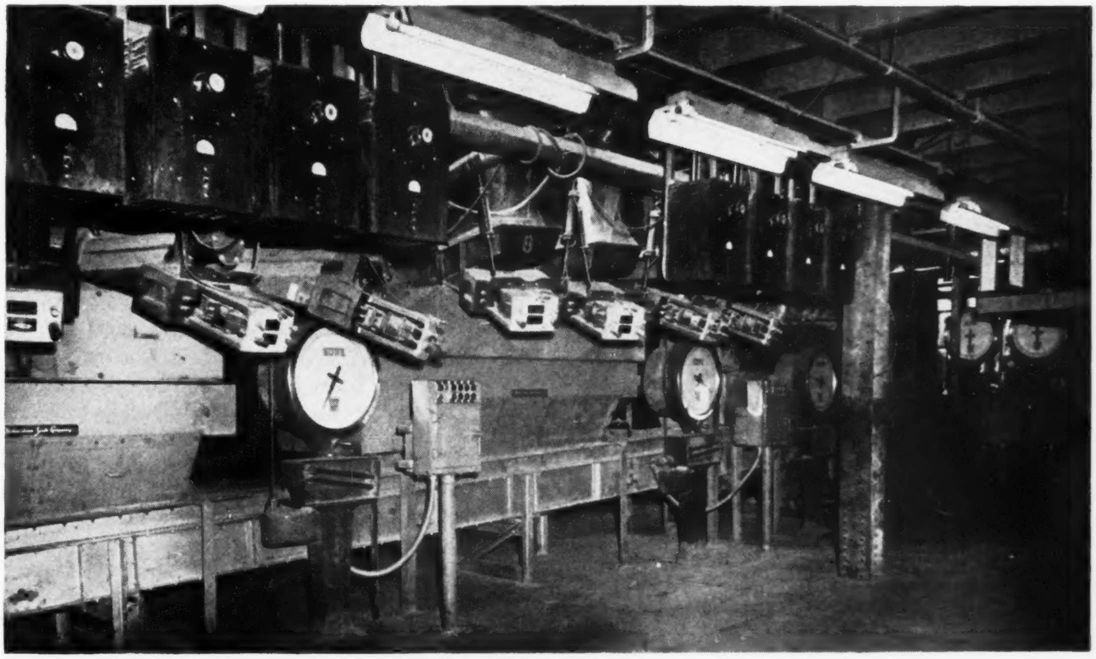


Fig. 4. Conveyor belt with side retainers for conveying rubber pellets and automatically weighed compounding ingredients to the Banbury mixer in a plant of The Ohio Rubber Co.

installations the transport of weighed charges from a central system be accomplished by a simple mechanized system of polished metal batch containers. Each container could be automatically cleaned prior to reuse to avoid contamination. This method also permits full utilization of the central compounding system since two or three containers would be held in readiness ahead of the mixer so that the compounding system would not have to synchronize exactly with the Banbury cycle.

Some details of the system can, and do, cause occasional difficulties. Some of the pigments which are required to flow through the feeders into the weigh hoppers of the compounding system are not always uniform and do not feed properly to the scale hoppers. Further work on inspection of materials received and specifications to vendors will eventually eliminate this trouble.

The batch discharge from the Banbury mixer is received into a large extruder equipped with a Hale pelletizer head to form the pellets which are then cooled and conveyed through a system similar to the one described previously, into storage ahead of the final mix Banburys.

Pellet storage is a little awkward in that the depth of pellets can usually not exceed two to three feet in order to avoid settling deformation and packing. The most common pellet handling and storage methods in use at the present time are: (1) individual batch buckets supported either on trolley or roller conveyor; (2) wide, long belts with side retainers; (3) a vertical stack of shallow boxes, each box with a power-operated sliding bottom. (See Figure 5.) Any of these methods is adequate, and the selection of the method, of course, depends upon the particular application.

The automation of the final mix Banburys requires considerably less equipment since these Banburys receive only previously mixed masterbatch in pellet form to which must be added a small amount of curing agents such as sulfur and accelerator. This conditions means that a central set of pellet weighing scales with associated bins and feeders together with a simple central pigment compound system is all that is required in addition to the automatic cycle control for each mixer. Out of the final mix Banburys the stock can be discharged into an extruder slabber (Figure 6) which converts the stock into sheet for processing through a cooling system, a cutter and a stacker, or the stock may be discharged into an extruder pelletizer. In another arrangement the stock is received on a sheeting mill for direct feed to warming mills ahead of a tread tuber or calender.


Richardson Scale Co.

Fig. 5. Shallow box with power-operated sliding bottom for rubber pellet storage and handling

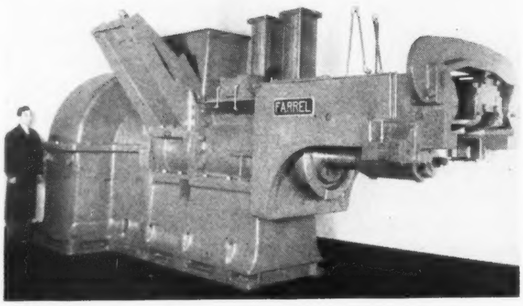


Fig. 6. Extruder-slabber by Farrel-Birmingham. This machine delivers a strip 50 inches wide and handles the output of a #11 Banbury mixer in 1½ minutes

Some mechanical difficulties with the pelletizers have been experienced with the processing of finished mixed stocks. The latest of these machines is designed to eliminate this difficulty by providing a quick-cleaning feature, when changing from one stock to another, and eliminating all of the shaft seals and other crevices where stock could deposit and return to a subsequent batch. (See Figure 7.) Most recent tests (May, 1955) of this machine indicate that operation with highly accelerated stocks without scorching or contamination difficulties is possible on a regular production basis.

In one large mechanical goods plant the extruders and the calenders for the various products are scattered over a wide geographic area. It is envisaged that the ultimate installation in this plant could utilize cold feed extrusion or some similar continuous processing method, with finished mixed rubber being delivered in pellet form by air conveyor from a central storage area near the mill room. Such a method would simplify the transporting of stock and allow only the quantity required to be delivered to the extruder or calender and eliminate some haul back.

Actually this installation has progressed to the point where the compounding of the masterbatch and finished mixed stocks is done automatically with two Banbury mixers operating unattended, with the compounding and cycle controls being located in a master control room and operated by one woman. (See Figure 8.) The results gained from automatic compounding in elimination of scrap and labor saving have been gratifying.

High Speed and Pressure Mixing

It has been demonstrated that the use of higher ram pressures on high-speed Banbury mixers (Figure 9) will permit mixing times of approximately one minute to two minutes, and under these conditions, automatic compounding, loading, and material handling are a necessity

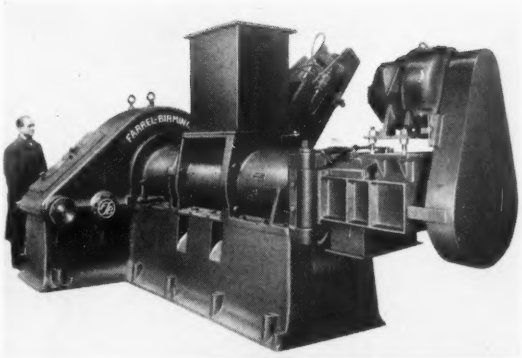


Fig. 7. Extruder-pelletizer with end-delivery head for handling compounded and finished stock. This machine has independent motor for operating the cut-off knives

since manual methods are too slow.

Operations of this type will become more prevalent in the industry as it becomes evident that the mixing capacity for a plant can be almost doubled by converting to high-pressure Banbury mixers with automatic compounding without increasing the number of mixers in this plant. This increased production, together with benefits of uniformity in mixing, reduced labor costs, and reduced scrap are obtained with about the same capital investment as would be required for adding additional conventional Banbury mixers with associated sheeting mills, batch-off equipment, etc., plus additional building space.

It is true that installation of automatic equipment such as found in an automatic compounding system will require additional maintenance. This maintenance, however, is becoming considerably less of a problem as the equipment vendors and engineers gain experience in this work.

Stock Preparation

The stock preparation processes include the forming and fabrication prior to vulcanization. Here the extrusion operation could lend itself to automatic control since it is a continuous-type operation. In some tire plants the tire tread is formed by one or two tread tubers fed continuously from warming mills which in turn receive hot stock via strip conveyors directly from the sheeting mill under the final mix Banbury. This method is commonly referred to as "direct-feed tread tubing," as compared to the more commonly used system of feeding the warming mills with cold sheet stock from skids. In the latter method the Banbury is permitted to operate independently without regard to the variations in rate of feed to the extruders.

In the direct-feed setup usually two 84-inch mills are interposed between the Banbury sheeting mill and each extruder, and these two mills are usually attended by one operator. The mills are receiving the stock intermittently as each batch is unloaded from the sheeting mill, and the operator attempts to control the mills in such fashion that the ribbon of stock which is fed into the extruder is of uniform temperature and plasticity. There is usually some sacrifice of Banbury capacity in operating with the direct-feed arrangement; however, it can usually be justified by the elimination of the stacking and the transporting of stock.

The extrusion operation in most plants involves considerable rework of raw material due to frequent die changes and corresponding off-gage treads produced initially after each change. If more than 90% of the material extruded is accepted as satisfactory, it is usually considered an efficient operation for a tuber line running treads for a full line of tires. Some indicating devices are being used to assist the operators in controlling the continuous process. Among them are:

1. Continuous weighing scale for measuring the unit weight of the tread as it leaves the extruder die.
2. Low-temperature type of radiation thermopile for measuring the temperature of the material as it leaves the extrusion die.
3. Low-temperature radiation thermopile for measuring the temperature of the material being fed into the extruder.
4. Speed indicator on extruder screw.
5. Speed indicator on take-away conveyor.

These indicators are used at present by the operator to assist him in maintaining the uniform flow of material through the extruder which is essential to obtain uniform gage from the die. The next obvious step is to utilize some of these indicating devices as controllers. For instance, the stock temperature indicating device ahead of the extruder could be utilized to regulate auxiliary heating units on the strip conveyor feeding material to the extruder.

It is not too difficult to maintain uniform conditions at the extruder itself. Variables such as extruder speed, cylinder temperature, and die temperature are fairly easy to control by well-known methods. The most troublesome variable is in the stock feed to the extruder since this usually originates from manual feeding of cold sheet stock into mills, manual cutbacks and strip feed to the extruder. Even the best systems produce variations in the material being fed to the extruder

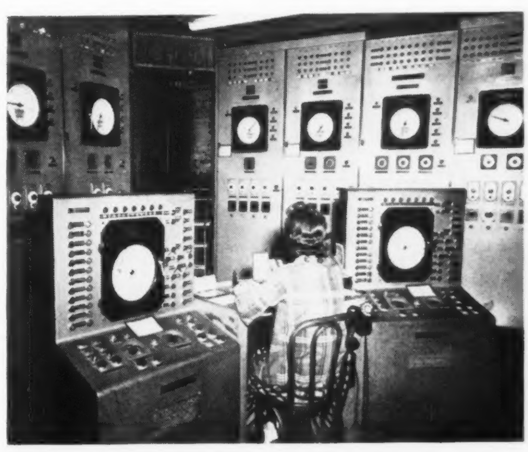


Fig. 8. Automatic control center for operating two Banbury mixers automatically at a plant of The Ohio Rubber Co. One woman operates all the controls involved in this operation

which cause corresponding variations in the extended product.

The use of blended pellets of finished mixed stock being fed to a cold feed extruder or to a conventional extruder through a continuous automatic mill would undoubtedly minimize a great deal of this difficulty. A new machine of this type which will operate unattended, receiving cold pellets and delivering a uniform blended hot feed to the extruder, is now in the final stages of development.

The use of cold feed extruders for tread forming has been considered in order to gain the advantages of uniform warmup and to minimize labor. This type of extruder will have to be somewhat larger with considerably more horsepower to attain equivalent capacity. This method will undoubtedly be given further consideration with the successful use of pelletizers with finished mixed stock.

Cold Feed and CV Curing

In mechanical goods plants, cold feed extrusion is becoming more common, using either pellets or ribbon feed to the extruder. Western Electric Co. has done considerable pioneering of this process by developing the proper screws for use in a warmer extruder, and now operates a large number of insulating extruders using cold ribbon feed.

Another development in mechanical goods plants for extrusions is continuous vulcanization in tandem with the extruder. This is common practice in rubber insulated wire plants where it is relatively easy to accomplish since the rubber is carried on a core during the curing operation. Unsupported rubber, when extruded in complicated form with thin sections, requires a different approach. One method is the use of dielectric heating, with the extruded shape supported in a moving trough of inert powder such as soapstone. The powder is preheated to curing temperature, and the material receives its heat from the dielectric source to bring the interior of the mass up to curing temperature.

One of the principal difficulties to date has been that of getting completely uniform dispersion of the curing and reinforcing materials in the rubber since any nonuniformity will seriously affect dielectric heating. As previously mentioned, the use of an automatic mill with superior warming and dispersing ability should go a long way toward eliminating these difficulties. Further work and development in this field will probably lead to a continuous curing process technique with more general application to various extruded shapes.

Fig. 9. Banbury #11 mixer equipped with large cylinder for high pressure and special drive for high-speed operations

Fig. 10. Automatic tire building machine made by National Rubber Machinery Co.

Calendering

In calendering, particularly in coating cord or fabric for tire carcass use, several steps have been taken toward continuous operation and also automatic controls. Tandem operation of the fabric predipping unit with either a four-roll calender or two three-roll calenders is now common in the tire industry, with gratifying results in product uniformity and lower costs of operation. The use of automatic controls could further improve this process, particularly in the following operations:

1. Regulation of calender roll opening in response to thickness gages measuring the rubber coating as it is formed on the calender.
2. Regulation of temperature of feed stock in response to low-temperature radiamatic thermopile indicator controllers.
3. Regulation of rate of feed of material in response to speed of calender with override trim adjustment in response to size of the stock bank in the calender.

In most mechanical goods plants the duration of run through a calender of one particular stock is usually very short, and the quantity of material will not justify the investment in automation. There are some exceptions, such as calendering preforms for floor mats where automatic gaging, automatic control of the stock feed, and automatic cutting of the sheet after it leaves the calender, can be justified, and in some cases are being used.

Preforming

Preforming, another type of stock preparation, also offers some opportunity for automation. For instance, in tire building considerable progress has been made toward mechanizing operations, and it is generally agreed that a completely automatic tire building machine is practical where only one size and specification of tire is required

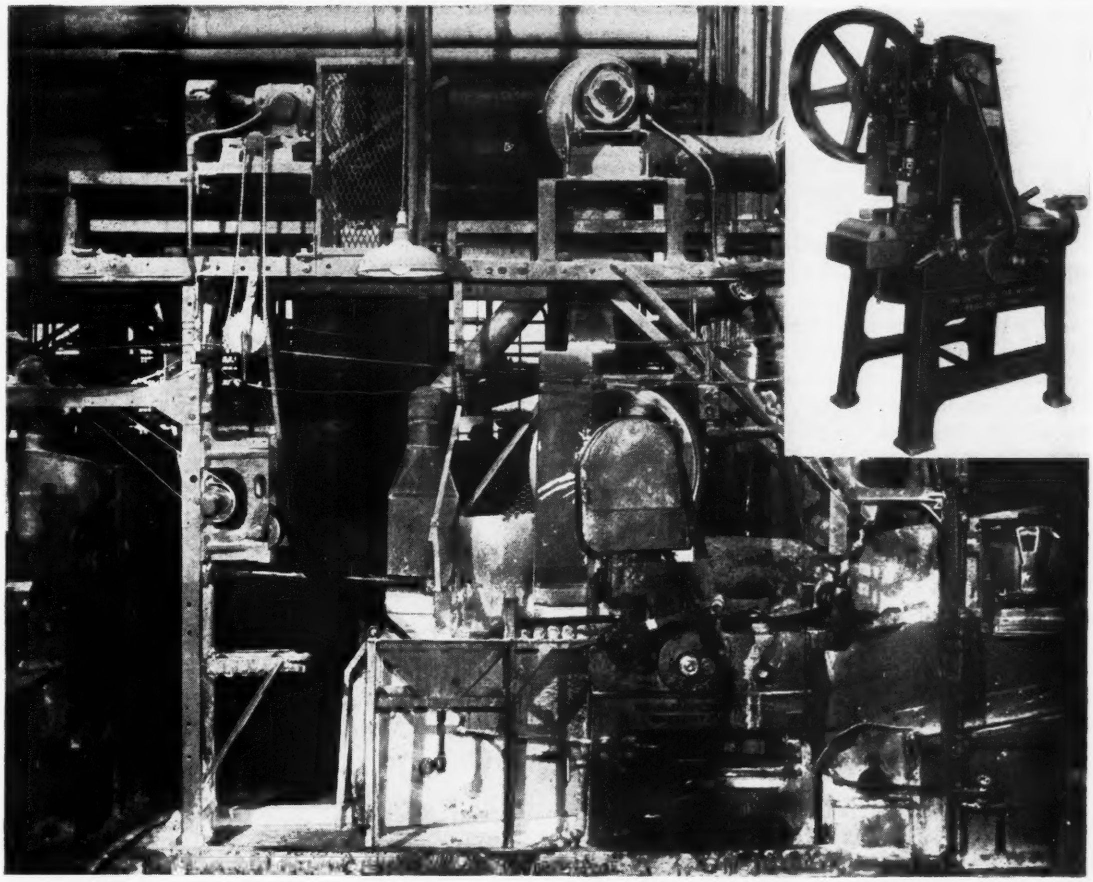


Fig. 11. Strip feed entering dip tank just ahead of volumetric blanker for dieing out heel slugs in a plant of Goodyear Tire & Rubber Co. Inset shows close-up of volumetric blanker made by James Coulter Machine Co.

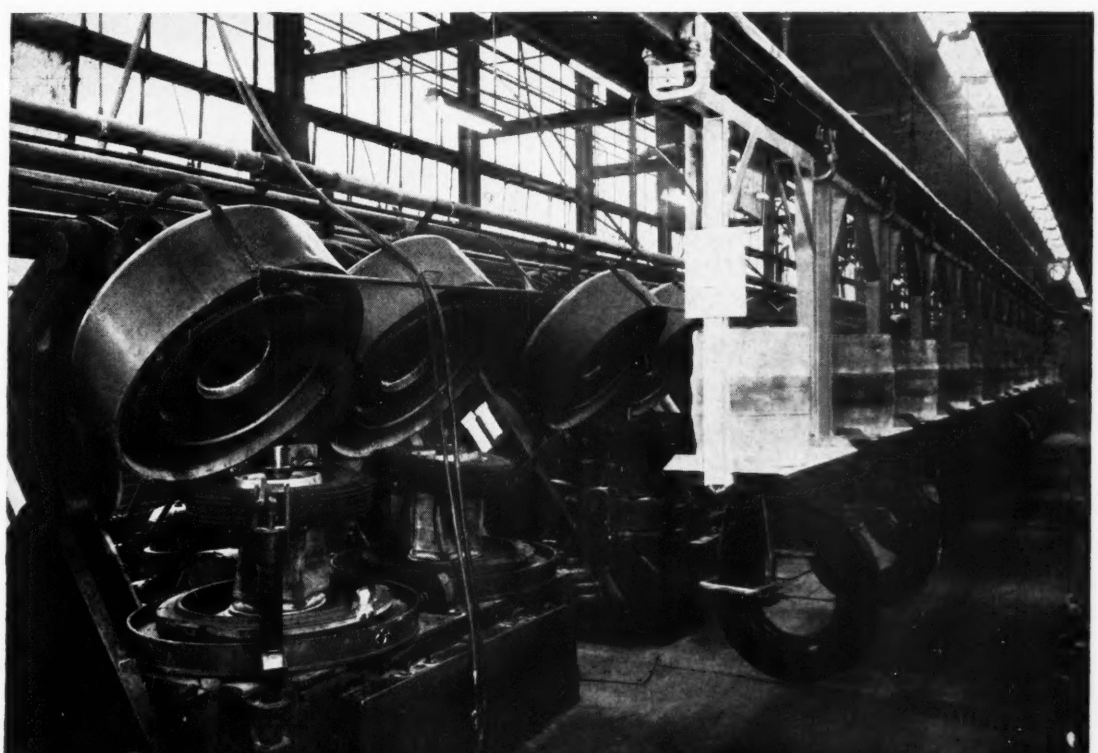


Fig. 12. Automatically controlled trains service Bagomatic presses with uncured tires and take away cured tires to finishing department in the Buffalo, N. Y., plant of Dunlop Tire & Rubber Co. Conveying train by Louden Machinery Co., and Bagomatic presses by McNeil Machine & Engineering Co.

and where the materials fed to the machine can be maintained uniform within close tolerances. A few machines of this type are in operation. (See Figure 10.) In most instances, however, the mechanization has been only partial and coupled with a sequence timer controller so that the operator has merely to feed the material to the drum, with the stitching and rolling operation being performed mechanically. In this operation, limitations of automation are principally due to present inability to obtain complete uniformity of the materials coming to the tire builder and the necessity of running a variety of specifications from the same machine.

In the mechanical goods plants the preforming operation usually consists of the preparation of slugs to fit into mold cavities for curing, and some strides have been made toward continuous and automatically controlled operations in this department. For instance, the use of a volumetric blanker operating continuously on a ribbon of uniform stock fed from a calender or mill is of practical use where a reasonable number of the same-size preforms is required for pressing operations. Under these conditions a properly designed volumetric blanker will hold the weight of the preform within a fraction of a gram, with resultant savings in material and labor. The new machines with arrangements for quick die changes are particularly useful in this field. (See Figure 11.)

In many types of product considerable hand-work is required for the preparation of complicated preforms, and usually the development of automation would be prohibitively expensive, particularly if useful for only one product.

Curing

The curing process in the tire industry has come a long way since the old "pit" days when the tires were cured in pot heaters. The use of the Bagomatic press with integral curing bag now permits one operator to service 64 or more cavities with curing cycles in the neighborhood of 18 minutes. Automatically controlled trains loaded with green tires for about 16 cavities pull up and stop in front of the proper presses to permit the operator to service the cavities; then the train delivers the cured tires to a conveying system to deliver them to the finishing department. Automatic controls play an important part in the operation of the presses and the trolley trains. (See Figure 12.)

Mechanization in the mechanical goods curing processes has not reached such an advanced stage, principally because of the diversification of products. However, the use of automatic presses of the tilting-head type, both hydraulic and mechanical, is increasing. (See Figure 13.) These presses eliminate the handling of the molds, and one operator can service a number of presses in a manner similar to that used with the Bagomatic presses in tire plants. In many instances the molds are of the transfer injection type where it is desirable to form a number of small items with or without core bars. Here, again, automatic controls initiate all the actions of the press and regulate the platen temperatures.

Automatically controlled continuous curing is fairly common in the foam rubber processes; the heat source is steam, hot air, or dielectric energy.

Finishing

Considerable progress has been made in mechanization in the finishing departments of tire plants in recent years, with equipment such as automatic painting machines, buffing machines, and the use of conveyors between operating stations. In the mechanical goods plants the finishing operations represent the major part of the direct labor on many products.

The use of dry ice tumbling for the removal of flash and the mechanization of some trimming operations have reduced finishing costs on some products, but a great deal is yet to be done. The wide variety of shapes and sizes of articles forms a considerable obstacle to mechanization of mechanical goods finishing.

Warehousing and Shipping

In the warehousing and shipping operations, modern material handling methods have helped reduce costs. Two approaches to efficient storage in tire plants have been made, one by the use of pallet-type compartments which can be stacked one on the other by the use of lift-type fork trucks, and also by the use of metal tire racks where the tires are stored and removed by the use of lift trucks with special attachments for handling tires in groups.

Plastics

In the plastics industry we touch briefly on the extruder and injection molder as being the most common converting fields. A typical example of continuous processing in the extrusion field is that of continuous vacuum forming lines. In this process granular plastic is fed to an extruder from a hopper, extruded as a sheet from 24 to 40 inches wide, run through polishing and orienting rolls and then through a continuous vacuum draw molding machine which delivers the finished product, such as spoons, picnic plates, trays, cups, etc., into continuous packaging equipment which boxes them for shipment. The entire process is synchronized and, of course, utilizes many automatic controls such as temperature, speed, sequence, time, etc. This system permits one man to service two or more machines, principally handling material.

Many plastics injection molding machines are now being fitted with automatic mold stripping equipment so that the machine can operate unattended, permitting one operator to service a number of machines. Here again automatic controls are important, regulating temperatures, cycles, pressures, etc.

Summary and Conclusions

There is a tremendous market for automation in the rubber industry both in increasing the use of methods that have already been developed and in the field of developing suitable automation for operations now performed manually. One of the most common objections to automation is the increased maintenance cost due to the complexity of electrical and mechanical equipment. Every effort should be made by the engineers to make sure that the equipment, control devices, and instruments selected for this work be of the most rugged type

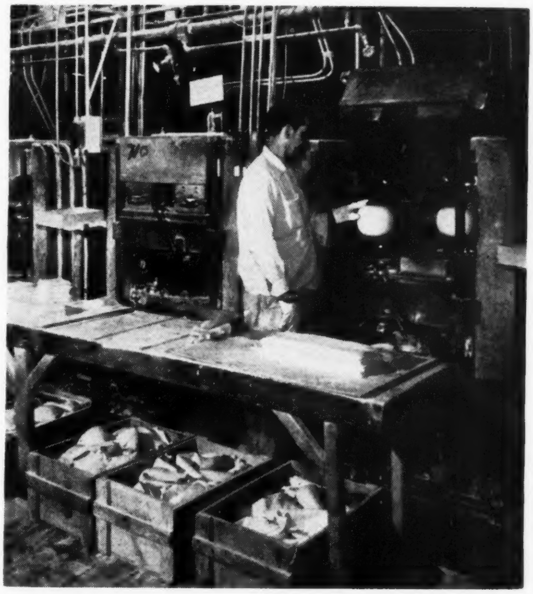


Fig. 13. Tilting-head presses in use in plant of Davidson Rubber Co.

to avoid the complaint that in some cases automation merely substitutes maintenance mechanics for labor. There is also a tendency to over-glamorize the term "Automation" and to offer it as a panacea for all problems of high manufacturing costs. Careful evaluation of the proposed applications with a realistic allowance for additional maintenance will help to avoid the misapplication of automatically controlled mechanization.

Another factor which holds back the expansion of automation, particularly in the small and medium sized companies in both the rubber and plastics industries, is the lack of an engineering force with opportunity and authority to concentrate on the development and installation of justifiable automation. In most instances the plant staff engineering group is more than occupied with the day-to-day problems of plant maintenance and tooling for new products. As the need of engineering of automation increases, it will probably be answered to some extent by capable consultant groups who are naturally isolated from the daily maintenance and tooling problems.

Predictions are that we will continue to have a buyer's market, with correspondingly soft prices and small margins. There is also pressure for an annual increase in labor rates. This climate will stimulate further application of automation in industry. True, there will be a strong resistance due to shortage of capital to finance automation.

Inevitably, however, some degree of automation will be most necessary for a rubber manufacturing business of any size to exist in the highly competitive markets of the future.

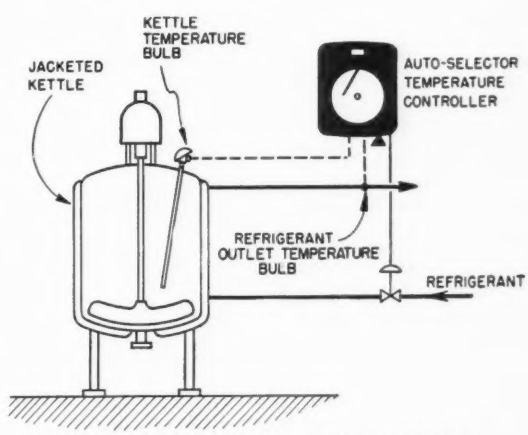
Polymerization Refrigerant Flow Controller

What is said to be a one-instrument solution to problems of both freeze-up and overheating of refrigerant-cooled kettles in the cold polymerization of rubber and plastics, except where the reaction is highly exothermic, has been announced by The Foxboro Co., Foxboro, Mass.

The new system uses an instrument called an Auto-Selector controller instead of the conventional single-action instrument. When refrigerant outlet temperature, influenced by load changes, tends to drop below the level which might result in freezing, the controller automatically throttles the refrigerant intake valve to raise refrigerant temperature. When the cooling load drops off, the refrigerant temperature can rise above its preset minimum, and the controller can again act on kettle temperature measurement, operating the valve to prevent the kettle from overheating.

The instrument also controls refrigerant flow while the kettle is charging, impossible to do with single-action control based solely on the kettle bulb since the latter is not immersed until the kettle is partially filled.

Data sheets, AED 282-5 and 282-8, which give complete information on polymerization kettle control, including cascaded systems for exothermic reactions, are available from the company.



Schematic diagram showing use of Auto-Selector controller for temperature control of refrigerant-cooled batch kettles

Seasonal Variation in Hevea Latex Properties[1]

By M. VAN DEN TEMPEL and G. M. KRAAY
Rubber-Stichting, Delft, Holland

and H. J. LUNSHOF
Rubber Cultuur Maatschappij "Amsterdam," Klein Sungei Karang, Sumatra

Concentrate from Hevea latex tapped around February indicates lower stability which may be due to the effect of refoliage of the trees on the composition of the field latex. Controlled addition of surface-active material in the formulation of the compound by the consumer is suggested.

The conditions during shipment of the concentrate, which covers a period of about three months between tapping and delivery, were found to have surprisingly little effect on the composition and properties of the latex for the experiments reported in this paper.

AMMONIA-PRESERVED, centrifuged latex is now used in rapidly increasing quantities by a large number of industries. In many cases the quality and the uniformity of this material are considered satisfactory, but in those industries which use the latex in sensitive processes, such as the manufacture of latex foam or latex thread, the natural variability in processing behavior is still sometimes felt as a disadvantage. Elimination of this variability is urgently desired by consumers; the present paper describes one aspect of the attempts made by latex producers to eliminate the various sources of variability in their product.

Several causes of variability have been the subject of earlier investigations.[2,3] The variation in properties caused by incomplete control of the production process or of storage conditions has been largely eliminated by the big producers where the production process is closely controlled by well-equipped laboratories. Variability caused by different clones or soil can be largely avoided within one single production unit by careful selection of the area used for latex production. One important cause of variability which has been recognized, but which cannot be completely eliminated at present, is connected with the seasonal variations in latex composition.

Kidder[3] investigated the effect of the tapping season on the properties of specially prepared, preserved concentrates after one month's storage. The occurrence of low mechanical stability and high KOH numbers in the samples tapped in the dry season was related to the higher dry rubber content (DRC) of the field latex in that period, though it was recognized that refoliage of the trees might have a bearing on the properties of the latex.

The properties of ammonia-preserved latex change gradually during storage, and it might be expected that the rate of change of the properties depends largely on the temperature of the latex when stored. The latex-producing estates are all situated in the northern hemisphere, where wintering of the trees occurs at or around February. Storage of the preserved concentrate tapped during the wintering season, and especially its transport to the consuming countries, occur at a relatively low temperature. This might constitute another cause of seasonal variability in processing behavior.

When it is taken into account that consumers often use latex which is less than three or four months old, it becomes apparent that optimal properties may not yet have developed during the cold season. In that case the processing behavior of the latex will depend strongly on its exact age, and on its temperature during shipment.

A more extensive investigation of the seasonal variability in commercially produced concentrates, carried out in the consuming countries, appeared useful in order to devise methods to eliminate the effect.

Experimental Details

The manufacturing behavior of preserved concentrate tapped at or around February may deviate from the properties during the rest of the year for two different reasons: (a) The original field latex may show seasonal variability in composition caused either by metabolic changes in the tree during refoliage or by variable dilution with rain water; or (b) The concentrate stored and transported at low temperatures may not have attained optimal properties in the two or three months available.

The present experiment was designed in such a way that a distinction could be made between the two pos-

[1] Communication No. 287 of Rubber-Stichting, Delft, Holland.
[2] E. W. Madge, H. M. Collier, J. D. Peel, *Trans. Inst. Rubber Ind.*, 26, 305 (1950).
[3] G. A. Kidder, India Rubber World, 124, 563, 699 (1951).

sible causes of variability. At about the fifteenth of each month between December, 1953, and June, 1954, a sample was taken from the latex of which a bulk shipment was made on that date. The samples were taken from the ship's tanks immediately after filling from the company's storage tanks at Belawan, Sumatra.

The sample was divided into two equal parts and put into glass bottles filled to the top and hermetically sealed. Part (a) was immediately sent to Delft by air, and thereupon stored at a temperature of about 7° C. (44.6° F.). Part (b) was stored for one month at Belawan and thereupon sent to Delft by boat; this sample had been exposed to temperatures of about 28° C. (82.4° F.) for one month and to varying temperatures, much in excess of

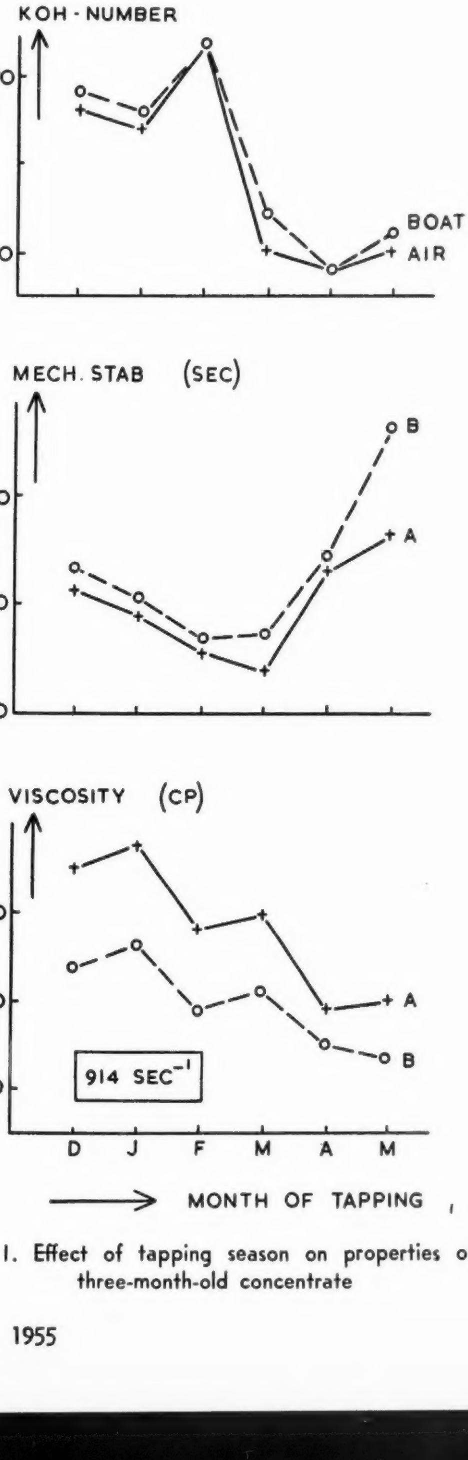


Fig. 1. Effect of tapping season on properties of three-month-old concentrate

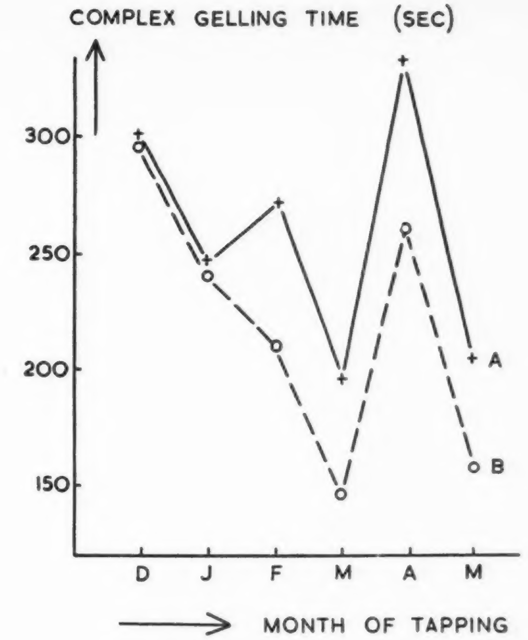


Fig. 2. Effect of tapping season on zinc complex gelling time

7° C., for the remaining two months. The average tapping date of the latex preceded the date of shipment in all cases by about 7-10 days. Investigation of the samples at Delft occurred three months after the average tapping date.

The investigation of the samples was carried out by standardized methods and included the determination of higher fat acids, volatile fat acids, carbon dioxide, and phosphate.[4] Free amino acids were determined by a Sörensen titration in the clear serum obtained after flocculating the latex with sodium chloride and magnesium chloride, followed by precipitation of the proteins by boiling with acid. The ammonia was removed from the serum by prolonged boiling in the presence of magnesium oxide. The amino acids were finally titrated with alkali in the presence of an excess of formaldehyde.

The solubility of zinc oxide in the preserved concentrate was determined polarographically.[5] The reactivity of the dissolved zinc complex was determined by measuring the time (in seconds) necessary to gel the latex at 70° C. (158° F.) in the presence of 150 m. mols of zinc ammonia complex and 1,900 m. mols of total ammonia, both per liter of serum, at a DRC of 50%.

The viscosity of the uncompounded latex was measured in a viscometer of the rotating cylinder type, at varying rates of shear.

Results of Experiments

The results have been collected in Table 1 and in Figures 1 and 2. For easy reference, some data have been included in the table which represent the average composition of six samples of latex from the same origin,

[4] M. Van den Tempel, *Trans. Inst. Rubber Ind.* 29, 312 (1953).
[5] M. Van den Tempel. This paper is to be published in *Trans. Inst. Rubber Ind.*

TABLE 1. COMPOSITION AND PROPERTIES OF LATEX SAMPLES

	Sent by Air (a)						Sent by Boat (b)						Aver. of 6 Commercial Samples
Tapped in	Dec.	Jan.	Feb.	Mar.	Apr.	May	Dec.	Jan.	Feb.	Mar.	Apr.	May	
KOH number	0.68	0.67	0.72	0.60	0.59	0.60	0.69	0.68	0.72	0.62	0.59	0.61	0.65
Mech. stability, sec.	305	295	280	270	315	330	315	300	280	285	320	380	460
Anions in m.equ. per liter of serum:													
Higher fat acids	49	45	45	39	43	43	49	43	44	38	42	42	44
Volatile fat acids	28	26	22	23	16	14	27	28	22	19	17	16	20
Amino acids	36	37	37	34	32	33	35	37	37	33	31	32	38
Photphate (total)	59	54	54	54	59	56	61	56	55	54	58	57	53
Carbon dioxide	61	33	35	40	34	24	49	42	36	36	35	30	35
ZnO solubility, m.mols per liter of serum	98	95	89	86	84	85	86	82	80	73	98	85	*99
Zinc complex gelling time	300	245	270	195	330	205	295	240	210	145	260	155	—
Viscosity at 914 sec^{-1}, cp.	65	68	58	60	49	51	54	56	49	51	45	44	*47
At 58 $sec.^{-1}$	105	105	98	100	77	72	87	90	78	84	70	73	—

*Average of four samples only.

obtained between June, 1953, and July, 1954. These six samples were part of regular bulk shipments from Belawan to Amsterdam and were obtained from the company's storage tanks in Amsterdam in drums.

All samples had a DRC between 60.2 and 60.6%, and an ammonia content of between 0.71 and 0.73% of the latex.

Comparison of the various data shows that the mechanical stability of the 12 samples of the present experiment is invariably lower than that of the six samples which had been transported in bulk. This condition is attributed to the rigorous exclusion of contact with the atmosphere during transport and storage. Actually, the mechanical stability increased rapidly after the bottles had been opened for investigation.

The KOH number shows a considerable variability. Comparison with the concentrations of the ionic constituents, as given in the table, shows that this variability in KOH number is not due to variations in the concentration of only one of the acidic components. The amounts of the various anions in the serum are in most cases fairly constant, but the small variations may be additive and thus produce a high KOH number. The composition of the December sample (high volatile fat acids and carbon dioxide content) may thus be correlated with the KOH number of that sample, but the exceptionally high KOH number of the February sample cannot be explained similarly.

The behavior of the latex, when compounded with zinc oxide, has been shown to depend mainly on the zinc oxide solubility in the serum and on the reactivity of the dissolved zinc-ammonia complex. The solubility of zinc oxide in the various samples is normal; the relatively small variations can, at present, not be understood in terms of latex composition. It is doubtful whether these variations will become apparent in manufacturing processes, as the zinc oxide solubility is affected to a considerable extent by the de-ammoniation which occurs generally as a first step in many processes. This effect of de-ammoniation will tend to level out the small differences originally present.

The gelling time with zinc complex is considered to have a more direct bearing on the behavior of the compounded latex. This property shows considerable variation which cannot be explained completely in terms of latex composition. The high gelling times of the April samples may be attributed to the relatively high inorganic phosphate content of the serum. Of the total phosphate content of the latex, as given in the table, the larger part is present as organic phosphate-ester in the serum, whereas only about 20% is inorganic phosphate. In the April samples, however, the proportion of inorganic phosphate is slightly over 30%. The stabilizing effect of inorganic phosphate on latex containing zinc complex, which has been reported earlier,[6] is not exerted by organic phosphate compounds such as glycerophosphate.

The viscosity of the various samples is higher than normal, especially at the lower rate of shear. This is as would have been expected from the inverse relationship between viscosity and mechanical stability reported by other investigators.[3] In both series, however, there is no simple relation between the mechanical stability and the viscosity at a given rate of shear.

Discussion of Results

The following properties show extreme values in the period considered:

Mechanical stability, (low) in March
KOH number, (high) in February
Viscosity, (high) in January
Zinc complex gelling time, (low) in March
Higher fat acid content, (low) in March

The extreme values are all in the direction of a *lower* stability of the latex tapped around February.

It is noticed that the (a) and the (b) series behave, in this respect, identically. The abnormal properties are, therefore, due to variations in the composition of the field latex, which may be connected with the "wintering" of the trees.

[6] G. M. Kraay, M. Van den Tempel, *Trans. Inst. Rubber Ind.*, 28, 144 (1952).

Effect of Tapping Month

The samples tapped in December are also slightly abnormal when compared with the average composition of all other samples of latex from the same origin. In the December samples, however, the high KOH number is clearly correlated with relatively high values for the volatile acids and carbonate content. The properties of these samples may therefore be explained by the occurrence of bacterial infection during some stage of the production process or storage. A similar explanation does not hold for the extreme properties of the samples tapped in February or March. It is tentatively concluded that the extreme values of some properties which may occur around February deviate more from the average values obtained throughout the year than do values which may sometimes occur as a result of insufficient control during production or storage.

Effect of Storage Conditions

The differences between the (a) and the (b) samples have been investigated by means of the "Student's" (W. S. Gosset) test. The "average difference" between the values of a given property in the (a) and the (b) series is considered significant if the probability of finding a higher value of this difference at the given number of experimental data is less than 5%. If, prior to the application of this test, it is considered that the differences between the results of a given test in the (a) and the (b) series should in all cases be positive (or negative), significance may be assumed to exist if the probability of finding a higher value for the "difference" is only 2.5%. The differences between the KOH numbers and the mechanical stability values are only significant when this additional assumption is made. This illustrates the smallness of the differences between the corresponding (a) and (b) samples, which is surprising.

The (a) samples have been stored at lower temperatures than the corresponding (b) samples; it might, therefore, be expected that the development of "ultimate" properties would have proceeded further in the (b) samples. This is the case with respect to: mechanical stability, viscosity, KOH number.

Some unexpected differences have, however, been found between the samples of the (a) and the (b) series which cannot be explained with our present knowledge of the effect of temperature on latex properties. These differences include: the higher fat acids content, the higher amino acids content, and the higher zinc complex stability of the (a) samples.

The smallness of the differences between the (a) and the (b) samples in this investigation may also be connected with the rigorous exclusion of contact with the atmosphere, as some preliminary experiments on the influence of temperature during "maturation" of the latex had indicated a very considerable effect.

Rainfall Not Significant

Most of the extreme properties obtained during the "wintering" season might be explained by the occurrence of a higher DRC in the field latex, due to less dilution with rain during tapping. In Sumatra, however, there are no exceptionally wet or dry seasons. The average amount of rain per month during the season of the experiment was between 95 mm. (March) and 189 mm. (May); the average dry rubber content of the field latex in these months was 33.6 and 33.0%. It is evident that this amount of dilution cannot be responsible for the variation in properties, and it appears, therefore, that the seasonal variation in latex properties is due to variations in the composition of the field latex, connected with the refoliage of the trees.

On the other hand, the effect of dilution of the latex, prior to centrifuging, on the properties of the final concentrate might be used to eliminate most of this seasonal variability.

Conclusions

Concentrate from *Hevea* latex which has been tapped around February differs in several respects from latex obtained during the rest of the year. The differences indicate a *lower* stability of the latex tapped in February and March. This kind of variability may be due to the effect of refoliage of the trees on the composition of the field latex. The obvious remedy would consist in the controlled addition of surface-active material in the formulation of the compound which is being used by the manufacturer.

The conditions during shipment have surprisingly little effect on the composition and properties of the latex. This may be connected with the very slow development of ultimate properties in the samples of the present experiments, which is attributed to the rigorous exclusion of contact with the atmosphere during storage and transport.

Acknowledgment

This work forms part of a program of research on latex variability undertaken by the research department of Rubber-Stichting, under the management of H. C. J. de Decker. The authors are indebted to F. H. D. Akkerman, A. J. de Vries, and J. F. Benders for many helpful discussions.

Correction

In the article, "How to Treat Tensile Data of Rubber —I— Graphical Method," by Shigeo Kase, which appeared on pages 504-506 of the January, 1955, issue, of Rubber World, in Figure 1, the median line was incorrectly designated as a dot and dash line to the right of 0.367. The median line should have been designated as the solid line at 0.367.

Similarly, the mean was incorrectly designated as the solid line at 0.903; whereas it should have been the dot and dash line which was incorrectly identified as the median line.

The author also states that the left plotting line should have been —0.583 instead of —0.584.

Guest Editorial

Gateway to Hall of Fame

Charles Goodyear and the Hall of Fame

JOHN M. BALL

Chairman, Division of Rubber Chemistry, American Chemical Society

IT HAS been my privilege to nominate Charles Goodyear, the inventor of the vulcanization of rubber, to the Hall of Fame for Great Americans. This action is based upon my own convictions and desires as to the need to honor this great American as well as upon those of the Hall of Fame committee of the Rubber Division headed by Harry L. Fisher, past president of the Society.

Hall of Fame Requirements

The Hall of Fame for Great Americans is situated on the campus of New York University on University Heights, The Bronx, N. Y. Nominations were first made in 1900, when a total of 234 names was submitted, of which 29 received a majority of the votes and were elected. Every five years since then additional names have been added; the total number elected to date is 83. To be elected to the Hall of Fame, an individual must have been dead more than 25 years, must have been a citizen of the United States, and must receive a majority vote. Nominations may be made by any citizen. The present number of Electors comprises 126 eminent men and women throughout the country, chosen by the Senate of New York University.

The five inventors who have been elected to the Hall of Fame are: Eli Whitney, Samuel Morse, Elias Howe, Alexander Bell, and Robert Fulton. Two other inventors who were nominated previously and will be voted upon this year are George Westinghouse and Wilbur Wright. Charles Goodyear has been nominated again, as previously stated, so that he also will be voted upon again this year. The election this year will be from a ballot of 209 famous persons, the largest number since 1900. A maximum of seven distinguished nominees will be selected.

Illustration of Hall of Fame—courtesy of *New York University Alumni Bulletin.*

Goodyear's Qualifications

We think one reason our candidate has so far not been elected is that it has probably been difficult for the Electors to grasp the significance of a *process* as opposed to a *product.* Ralph F. Wolf, author of "India Rubber Man, The Story of Charles Goodyear," in a private communication, puts it this way:

"An inventor, to be remembered by the public, should create some concrete thing that can be examined, pictured, or visualized from descriptions. It is the fate of inventors of new processes to be forgotten if, indeed, they ever become known at all. Processes are intangible things, difficult to visualize and well nigh impossible for a biographer to make glamorous. The public sees and appreciates only the end-product and forgets the process that made it possible. What Goodyear discovered was a process."

The pre-eminence of our candidate is, however, unquestioned, as is made clear by this further statement by Mr. Wolf:

"Charles Goodyear, nevertheless, indisputably ranks as one of the ten great inventors of the industrial era. In the one hundred and fifteen years that have passed since this man vulcanized rubber for the first time, his discovery has revolutionized life on the greater

part of the globe. Civilization as we know it is wholly dependent upon vulcanized rubber in the fields of transportation, communications, and production and transmission of electric power. It is only because of Goodyear's discovery of vulcanization in 1839 that this indispensable base for automobile tires and tubes, for electric insulation, and for 32,000 other rubber products has been available."

In 1939, Conway P. Coe, then Commissioner of Patents, in a statement before the Temporary National Economic Committee, said:

"Among the patents granted prior to 1877 were some covering inventions that have put mankind under lasting obligation to their authors. Their influence and benefits are still among our heritages."

Mr. Coe listed 16 patents dating from Whitney's patent of 1794 to Orville and Wilbur Wright's patent of 1906. Mr. Coe referred particularly to the patents to Bell (1876) and to Goodyear (1844).

With respect to the importance of Goodyear's invention, Mr. Coe stated:

"This process produced the most valuable of all chemical products, and has given rise to industries that are fundamental to our present civilization. It is the key product of the immense auto industry and is indispensable for a thousand uses."

Mr. Coe then gave comparative data on the cotton gin, telegraph, and rubber industries as of 1937, from which it is clear that rubber was then by far the largest of these three industries.

Rubber Division Efforts

In 1939, E. B. Curtis, then chairman of the Division of Rubber Chemistry of the American Chemical Society, appointed a Hall of Fame committee with Thomas Midgley, Jr., as chairman; the other members were H. E. Simmons, H. I. Cramer, and Charles L. Parsons. For financial reasons this excellent committee found itself unable to carry out the ambitious plans which it had made for getting information to the Electors to encourage the election of Charles Goodyear in that one-hundredth anniversary year of vulcanization's discovery.

The chairman of the Hall of Fame Committee this year is Harry L. Fisher, who will do his very best to see that the Electors are properly informed on the merits of our famous candidate. The results of the election will be announced on November 1 by Ralph W. Sockman, director of the shrine at New York University, which will be just prior to the meeting of the Division of Rubber Chemistry to be held in Philadelphia, November 2-4.

The Electors of the Hall of Fame, should they honor Charles Goodyear, would do a great deal for all of us who live and who cherish the memory of the founder of the rubber industry.

John Drinkwater, in "Abraham Lincoln," has immortalized this thought:

"When the high heart we magnify,
And the sure vision celebrate,
And worship greatness passing by,
Ourselves are great."

• • • ● • • •

"Charles Goodyear, The Persistent Researcher"

WE WOULD like to add our support to the nomination again this year of Charles Goodyear to the Hall of Fame of Great Americans, by quoting the late H. E. Simmons in the October, 1939, issue of our publication, then known as India Rubber World.

"The invention of the steamboat, the cotton gin, the telephone, the airplane did not require much in the way of time to make illustrious Fulton, Whitney, Bell, and the Wright brothers, but the discovery of such an academic principle as the vulcanization of rubber has required the passage of a century before its real significance is appreciated. . . ."

R. G. Seaman
Editor

Meetings and Reports

More Than 1,000 at Detroit Rubber Division, A. C. S., Meeting; Dinsmore Selected as 1955 Goodyear Medalist

With an attendance of somewhat more than 1,000 members and guests, interesting papers at well-conducted technical sessions, plant trips of more than usual value, and an enjoyable Division banquet, the Detroit meeting of the Division of Rubber Chemistry of the American Chemical Society at the Sheraton-Cadillac Hotel, May 4-6, passed into history as one of the most successful meetings of the Division.

John M. Ball, Midwest Rubber Reclaiming Co., Division chairman, presided at the first technical session, at the business meeting, and at the Division banquet on the evening of May 5. Certain special features of this meeting including the presentation of "invited" papers on non-technical subjects, the evaluation of the quality of the technical papers in terms of contents, delivery, and visual aids, and the considerable amount of discussion following each of the papers presented may be attributed to special efforts by Mr. Ball.

Much credit for the success of the Detroit meeting goes also to J. T. O'Reilly and his hard-working committee on local arrangements, and appropriate tribute was made to this committee on several occasions by Mr. Ball.

Other special features of this meeting were the announcement that R. P. Dinsmore, Goodyear Tire & Rubber Co., had been selected as 1955 Goodyear Medalist, the announcement of the nominations for officers and directors of the Division for 1956, and the 25-Year Club meeting.

25-Year Club Luncheon

Attendance at the regular luncheon-meeting of the Division's 25-Year Club at the Detroit meeting was 175. Chairman for this meeting, E. J. Kvet, Baldwin Rubber Co., welcomed the members to the meeting and called attention first to the fact that one of the members present, G. L. Allison, The B. F. Goodrich Co., was celebrating his sixty-first birthday on that day (May 4). This event was appropriately celebrated by all.

It was then announced that the next meeting of the Club would be held at the time of the fall meeting of the Division in Philadelphia, Pa., with A. H. Nellen, Lee Rubber & Tire Corp., as chairman.

Mr. Kvet then turned the meeting over to C. R. Haynes, National Polychemicals, Inc., and past secretary of the Division, who asked the members to stand for a moment of silence in tribute to those of the Club who had passed on since the last meeting. These recently deceased members included H. E. Simmons, retired president of the University of Akron; R. D. Abbott, R. D. Abbott Co.; G. P. Loomis, Goodrich; Floyd Myers, F. F. Myers Co.; and Gladding Price, R. T. Vanderbilt Co.

For the first time the 25-Year Club luncheon-meeting included a head table, and those seated at this table with Chairman Kvet are shown.

Mr. Haynes next had the six new "freshmen" members of the Club stand and introduce themselves to the gathering, following which the usual elimination contest was held for the member present with the longest record of service in the rubber industry who had not previously been honored in this connection. R. R. "Bob" Olin, R. R. Olin Laboratories, Inc., with 48 years of service in the industry was so honored at the Detroit meeting.

The Business Meeting

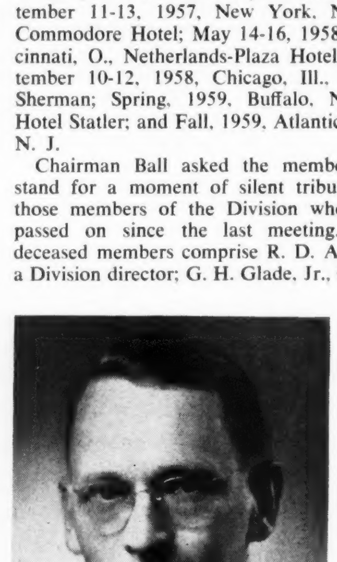
At the business meeting of the Division on the morning of May 5, Chairman John Ball reported the resignation of Amos Oakleaf, Phillips Chemical Co., as treasurer and the interim appointment of George E. Popp, of the same company, as assistant treasurer.

It was also reported that M. E. Lerner, *Rubber Age*, and chairman of a committee established to investigate the desirability of setting up an Office of Historian for the Division, had recommended to the executive committee that such an office be established. It was recommended further that the Division historian be appointed for a three-year period, have access to the historical records, and organize these records in proper form as soon as possible. The executive committee approved these recommendations, and Chairman Ball appointed a two-man committee to select candidates for the post.

Mention was made of the Hall of Fame committee under the chairmanship of H. L. Fisher, but due to Dr. Fisher's illness no report of the program to have the name of Charles Goodyear added to the Hall of Fame was available. An editorial in the RUBBER WORLD issue of June by Chairman Ball on this subject was indicated as a part of this program, however.

The places and dates for future meetings of the Division were announced as follows: November 2-4, 1955, Philadelphia, Pa., Bellevue-Stratford Hotel; May 16-18, 1956, Cleveland, O., Hotel Cleveland; September 19-21, 1956, Atlantic City, N. J., Chalfonte-Haddon Hall; May 15-17, 1957, (joint meeting with Rubber Division, Chemical Institute of Canada), Montreal, P. Q., Canada, Sheraton-Mt. Royal Hotel; September 11-13, 1957, New York, N. Y., Commodore Hotel; May 14-16, 1958, Cincinnati, O., Netherlands-Plaza Hotel; September 10-12, 1958, Chicago, Ill., Hotel Sherman; Spring, 1959, Buffalo, N. Y., Hotel Statler; and Fall, 1959, Atlantic City, N. J.

Chairman Ball asked the members to stand for a moment of silent tribute for those members of the Division who had passed on since the last meeting. The deceased members comprise R. D. Abbott, a Division director; G. H. Glade, Jr., Glade



B. S. Garvey, Jr. (left), and D. C. Maddy, nominees for 1956 Division vice chairman

Head table at 25-Year Club luncheon-meeting: left to right: John M. Ball; W. M. Nelson, U. S. Rubber Co.; Earl B. Busenberg, B. F. Goodrich Co., and 25-Year Club secretary; E. V. Kvet; C. R. Haynes; Amos Oakleaf; Bruce Silver, N. J. Zinc Co.; H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg. Corp., and past chairman of the Division; and C. P. Hall, C. P. Hall Co. (Informality due to the 88° temperature)

Mfg. Co.; G. S. Hiers, Collins & Aikman Corp.; T. J. Kerr, Deecy Products Co.; G. P. Loomis; Gladding Price; C. A. Rackus, General Aniline & Film Corp.; L. L. Ryden, Dow Chemical Co.; and H. E. Simmons, past Division secretary and Goodyear Medalist.

J. C. Walton, chairman of the Goodyear Medal Award committee, reported that R. P. Dinsmore, Goodyear Tire & Rubber Co., had been selected to receive the Goodyear Medal of the Division for the year 1955. The award will be made at the November meeting in Philadelphia.

The business meeting was concluded with the report of the nominating committee headed by S. G. Byam, of the Du Pont company. The nominations for officers for the year 1956 were as follows: chairman, A. E. Juve, B. F. Goodrich Research Center; vice chairman, B. S. Garvey, Jr., Sharples Chemicals, Inc., and D. C. Maddy, Harwick Standard Chemical Co.; secretary, A. M. Neal, Du Pont; and treasurer, George E. Popp.

Nominations for directors from the areas of certain sponsored rubber groups also follow: *Connecticut*, G. A. DiNorscia, B. F. Goodrich Co. Sponge Products Division, and Carl A. Larson, Whitney Blake Co.; *Detroit*, Herbert W. Hoerauf, United States Rubber Co., and Harold F. Jacober, Baldwin Rubber Co.; *Northern California*, John M. Holloway and Jacob Oser, both of Mare Island Naval Shipyard; *Philadelphia*, Anthony J. DiMaggio, Firestone Tire & Rubber Co., and George J. Wyrough, Wyrough & Loser; *Rhode Island*, Walter Blecharczyk, Davol Rubber Co., and Urbain J. N. Malo, The Crescent Co.; *Southern Ohio*, Stewart L. Brams, Dayton Chemical Product Laboratories, and Edward N. Cunningham, Precision Rubber Products Corp.; *Washington, D. C.*, L. A. Schlueter, American Coke & Chemical Institute, and Robert D. Stiehler, National Bureau of Standards.

The Division Banquet

At the Division banquet on the evening of May 5, Division Chairman John Ball presided and first reminded those present that the Division of Rubber Chemistry, A. C. S., was the third largest in the Society in membership, being exceeded only by the Divisions of Organic and Petroleum Chemistry in that order. Reference was made to the value of a meeting of a Rubber Division in the auto city since 500 rubber products other than tires were used in the present-day automobile.

John Henderson

Russian Commissar (M. E. Sharp) who appeared to explain the forced absence of Hendrik Van Hoey, scheduled speaker of the evening, and extol the glories of life in Russia as compared with life in these United States; Chairman Ball in the background

Chairman Ball also called attention to the fact that the week of May 2 during which the Detroit Rubber Division meeting was being held had special significance because it was the first week the nation's synthetic rubber industry was operating almost entirely under private ownership. It was pointed out that this situation was considered as the ultimate end of the government's entry into the synthetic rubber producing business by the late William Jeffers, wartime rubber director.

Instead of introducing those seated at the head table, Mr. Ball had these Division officers, directors, committee members, and special guests introduce themselves in the manner of certain television programs such as "What's My Line?" The photograph (page 356) shows those at the head table.

The after-dinner speaker, Hendrik Van Hoey, West European Rubber Processors, London, England, turned out merely to be a creature of the imagination of W. Wiard, Dow Corning Corp., local committee member in charge of banquet arrangements. The non-existent Hendrik Van Hoey was not seated at the head table during dinner and in his place a Russian Commissar (see accompanying photograph) made an entrance immediately after dinner and proceeded to explain with gestures the forced absence of Mr. Van Hoey and the glories of life in Russia as compared with life in the United States. The Russian Commissar was later revealed as M. E. Sharp, of Dow Chemical Co.

The banquet program was concluded with several fine variety acts.

The Technical Sessions

The technical sessions were marked by the high quality of the papers presented and several innovations in connection with the way in which these sessions were scheduled and run. Among these innovations was appearance of two "invited" papers on non-technical subjects on the program.

Chairman Ball in his introductory remarks at the beginning of the first session on the afternoon of May 4 explained that an electronic time keeper and warning apparatus evident on the speaker's platform was being used to warn those presenting papers when they were approaching and had reached the end of their allotted time. It was also explained that all papers were being judged for quality of their contents, delivery, and excellence of the slides or other visual aids used, and that the paper judged the best in all these categories would be announced at a future date.

The first two papers at the first session by the Frederick S. Bacon Laboratories dealt with silicone rubber. In connection with the permeability of silicone rubbers to air at room and elevated temperatures it was shown that compounds made with these rubbers were not temperature-dependent and therefore did not increase as much in permeability at higher temperatures when compared with other rubbers. In the second paper the considerable im-

John Henderson

Head table at Division banquet: left to right (top row): D. F. Reahard, Jr., General Tire & Rubber Co., director from Fort Wayne; J. R. Wall, Inland Mfg. Division, General Motors Corp., director from Southern Ohio; G. R. Sprague, Goodrich Sponge Rubber Products Division, director from Connecticut; C. O. Miserentino, Dunlop Tire & Rubber Co., alternate director from Buffalo; W. S. Edsall, Goodyear, director from Boston; B. S. Garvey, Jr., chairman of local arrangements for the fall meeting in Philadelphia; W. Wiard, Dow Corning Corp., Detroit local committeeman in charge of banquet arrangements; E. Krismann, Du Pont, advertising manager, "Rubber Chemistry and Technology"; Amos Oakleaf; (center row): E. R. Bridgewater; R. Warren, assistant executive secretary, A. C. S.; J. T. O'Reilly, Ford Motor Co., chairman local arrangements for Detroit; seat for Russian Commissar (M. E. Sharp), who was not present when this picture was taken; John M. Ball; A. E. Juve, Division vice chairman; A. M.Neal, Division secretary; W. J. Murphy, editor, "Industrial and Engineering Chemistry"; J. C. Walton, past chairman of the Division; (bottom row): Waldo L. Semon, Goodrich, past chairman of the Division and councillor, A. C. S.; seat for W. J. Simpson, Chrysler Corp., director from Detroit, absent when picture was taken; J. W. Snyder, Binney & Smith Co., director-at-large; L. M. Baker, General Tire, director from Akron; J. Breckley, Titanium Pigments Corp., director from New York; B. W. Hubbard, Ideal Roller & Mfg. Co., director from Chicago; F. W. Burger, Kleistone Rubber Co., director from Rhode Island; T. W. Elkin, R. T. Vanderbilt Co., director from Philadelphia; and R. D. Ford, Mare Island Naval Shipyard, director from Northern California

provement of the tear strength, resistance to swelling in various media, and heat aging characteristics of silicone rubber-Teflon blends were emphasized.

Two papers on polyurethane rubber made by E. I. du Pont de Nemours & Co., Inc., under the name of "Adiprene" B were next on the program. This rubber, which has outstanding abrasion, oil, and weathering resistance and good low-temperature flexibility, was stated to be made from a polyether rather than a polyester as is the case with similar-type rubbers such as "Chemigum SL" by Goodyear Tire in this country and "Vulcollan" in Europe. "Adiprene" B also differs from similar rubbers in that it is reinforced to a greater extent by carbon black. It was shown to be no more sensitive to water at room and higher temperatures than butadiene-styrene copolymers.

Optimum processing temperatures for "Adiprene" B are between 100 and 121° C., and after milling for a comparable period of time this rubber has a higher Mooney viscosity than natural or butadiene-styrene copolymers. Optimum temperatures for processing in extruders, on calenders, and for tire molding operations were given. The improved processability of this rubber, as compared with other polyurethane rubbers, was emphasized, but considerably more development in this field is required before useful articles can be produced commercially.

"Profits"— An Invited Paper

Ernest R. Bridgwater, of Du Pont in his paper on the subject of "Profits" first pointed out that there are many people who do not understand the profit motive

which has done more than any other single factor to stimulate economic progress in this country. Actually, the businessman who makes a profit because he produces efficiently, or creates something which satisfies a public need, is serving his community well and rendering a high order of social service, he added.

We all have an obligation to ourselves and, in view of the social importance of profits, to our community to strive vigorously to increase the profits of the firms with which we are associated, it was said. In the rubber industry, reduction in raw material and processing costs, better control of raw material inventories, and the production of the highest-quality products possible with the equipment available were cited as means by which the rubber technologist could increase the profit margin of the firm by which he was employed.

Other Technical Papers

Copolymers of 2-methyl-5-vinylpyridine with butadiene and terpolymers with butadiene and acrylonitrile, when quaternized with organic halo-compounds, were shown to have the particularly desirable properties of excellent oil resistance and flexibility at low temperatures. These polymers are available in sample quantities from Phillips Chemical.

Compounding research aimed at improving the aging and low-temparature properties of nitrile rubbers and at providing acrylate rubber stocks that would be resistant to di-ester lubricants at 350° F. for periods of 500 hours was the subject of papers by workers from Battelle Institute.

Studies on the reinforcement of synthetic elastomers which involved work with mica and carbon black and which emphasized the physical nature of the reinforcing action obtained with mica, as compared with the combined physical and chemical action with carbon blacks, were presented in three papers from Case Institute of Technology.

Further work on the analysis of the oxygen-containing groups on the surface of carbon black was reported by Phillips Chemical and revealed that the amounts of quinone, carboxylic and phenolic oxygen present on various blacks had now been identified to the extent of about one-half of the total oxygen believed to be present.

Esso Research & Engineering Co. suggested that the criteria for the longest-wearing tire tread is that it be made from a rubber that would be dynamically soft while at the same time tough and strong. Comparative test results showed that the softer Butyl rubber tread often proved superior to treads made from GR-S type rubbers. It was emphasized that abrasion loss is sensitive to the degree of slip and that conditions of driving will greatly alter the tire life on the road.

The Butyl rubber tread operates at less slip and shows less abrasive wear, under the same braking conditions, than GR-S. At a constant slip of 19.3%, however, where the force on the brake is different, the GR-S compound is slightly superior to that of the Butyl rubber tread, it was stated.

The Detroit Arsenal presented some very interesting results of testing tires at temperatures down to —65° F. which indicated that special GR-S polymers and natural rubber as well as rayon tire cord were required for satisfactory service of military tires under these conditions.

"Group Educational Activities"

The second invited paper on the program on the subject of "Educational Activities of the Rubber Groups," by H. L. Fisher, University of Southern California, was presented in the form of a general synopsis by Chairman John Ball because a sudden and unexpected illness prevented Dr. Fisher from attending the Detroit meeting.

Local rubber group educational activities mentioned were the Detroit Rubber & Plastics Group's courses in rubber technology at Wayne University; similar courses by the Chicago Rubber Group, but not conducted at or in connection with a college or university; the Rhode Island Rubber Club's sponsorship of a course in rubber compounding at the University of Rhode Island; the Boston Rubber Group's sponsorship of a course in rubber technology at Northeastern University; the Philadelphia Rubber Group's establishment of a graduate-level course at Villanova University; the extensive educational activities of the Los Angeles Rubber Group at the University of California under Dr. Fisher; and the four scholarships at the University of Akron recently established by the Akron Rubber Group.

Mention was also made of the plans of the New York Rubber Group and the Connecticut Rubber Group which are aimed toward the establishment of rubber technology courses in their areas.

The value of these educational activities in providing young men with a good start in their life work and in training others already with experience in the rubber industry to do better work was emphasized.

Final Technical Papers

Two papers from U. S. Rubber dealt with the mechanism of the oxidation of natural rubber and gave figures for the experimental ratios of carbon dioxide, formic and acetic acids produced to chain scissions. These ratios correspond to the loss of five carbon atoms per scission of the hydrocarbon chain.

R. P. Dinsmore

A paper from the University of Akron on emulsion polymerization of chloroprene with special reference to molecular weights and film properties was given. This paper confirmed and added to the results of earlier work by the Du Pont company on this subject.

Rubber vulcanized with dicumyl peroxide has demonstrated superior performance at low temperatures, better resistance to heat and sunlight, more resilience, and less tendency to discolor, than rubber vulcanized by conventional methods, according to Hercules Powder Co. The dicumyl peroxide replaced the entire sulfur vulcanizing system, and the new chemical is completely soluble in all forms of rubber, and natural rubber and general-purpose and oil-resistant synthetic rubbers are vulcanized equally well by it. In contrast to previously used peroxide vulcanizing agents, dicumyl peroxide is safe and easy to handle. Temperatures 290° F. or above were recommended for curing, but techniques for curing in hot air have not yet been worked out.

Immediate application of peroxide cures with dicumyl peroxide as the preferred curing agent for nitrile rubbers was suggested in a paper by the B. F. Goodrich Chemical Co. The unusually good low-temperature properties of some high acrylonitrile formulations may find application where good flexibility at low temperatures combined with best oil resistance is required.

The mechanism of the reaction of ozone with GR-S type rubbers was the subject of a paper from the Augustana Research Foundation, and details of U. S. Army Ordnance Corps investigation and research on ozone cracking and its elimination were the subject of another paper from the Detroit Arsenal.

Polymer Corp., Ltd., of Canada has investigated the degradation of oil-extended GR-S type polymers by heavy metal salts and has found that although these polymers are more prone to breakdown during drying in the presence of traces of heavy metal salts, this breakdown can be kept to a minimum if a very low iron-content-type of polymerization formula is used.

Alfin butadiene polymers may be extended with from 117 to 135 parts of petroleum processing oils to provide a material that may be now handled in the conventional manner and which will have vulcanizate physical properties similar to those of regular synthetic rubbers, according to a paper from Massachusetts Institute of Technology and Godfrey L. Cabot, Inc. This oil-extended Alfin rubber could be blended with ordinary synthetic rubbers despite its very high oil content. It was emphasized that much work remains to be done before oil-extended Alfin rubber becomes a commercial item.

An investigation of the oils used to extend GR-S for the purpose of determining which components were responsible for the development of staining and discoloration of light-colored vulcanizates on exposure to light was reported by Naugatuck Chemical Division, U. S. Rubber. It was

tentatively concluded that more than 30-40% aromatic components in the oils caused staining and that solvent-refined lubricating oils with less than the above-mentioned aromatic content would be satisfactory for most applications.

An equation for determining the amount and rate of breakdown of oil-extended masterbatches, when heat aged at 140° F., was presented in a paper from the Government Laboratories at the University of Akron.

A new method for the determination of free sulfur in rubber compounds by the use of triphenyl phosphine, which owing to its simplicity, rapidity, and accuracy is suited for routine control work, was the final paper on the program, from the Firestone Tire & Rubber Co.

Interest in the papers at these technical sessions was of high order as evidenced by the considerable amount of discussion following the presentation of all of them and the very full meeting rooms during all sessions.

Dinsmore 1955 Goodyear Medalist

As mentioned earlier, Ray P. Dinsmore, vice president in charge of research and development for Goodyear Tire & Rubber Co., was selected to receive the Charles Goodyear Medal for 1955 of the Rubber Division.

The Charles Goodyear Medal in commemoration of the discoverer of vulcanization of rubber is awarded annually to a person who has made a valuable contribution to the science or technology of rubber or related subjects.

A well-known authority on natural and synthetic rubber, Dr. Dinsmore has received national and international recognition for his many contributions to the rubber industry including the rayon cord tire, rubber hydrochloride film, and polyisocyanate rubber. He has many publications to his credit in the fields of physical testing, compounding, vulcanization, aging, processing, and the economic problems of synthetic rubber.

He holds an honorary degree of Doctor of Engineering from Case School of Applied Science and the Colwyn Gold Medal from the Institution of the Rubber Industry of England, of which organization he is a Fellow. In addition to being a past chairman of the Rubber Division, A. C. S., Dr. Dinsmore is a past chairman of the Akron Rubber Group, a trustee of the Midwest Research Institute, and a term member of the Massachusetts Institute of Technology Corp. for the period 1954-1959.

He is a member and president of the American Institute of Chemists for the term May, 1955-1956, a member of the American Association for the Advancement of Science, a member of the American Institute of Chemical Engineers, and, presently, a director and a member of the Chemists Club of New York.

Dr. Dinsmore has been associated with Goodyear for more than 40 years. He was appointed development manager in 1939 and since 1943 has held his present position.

Chicago Group Hears Morton; Presents Student Diplomas

"Education for Synthetic Rubber" was the subject of an address by Maurice Morton, director of rubber research at the University of Akron, Akron, O., given before 160 members and guests of the Chicago Rubber Group at the Furniture Club, Chicago, Ill., April 29. In harmony with the educational theme of the talk, 25 graduates of the Group's basic course in rubber technology, invited for the occasion, were presented with their diplomas.

Dr. Morton expressed the view that rubber technology had ceased to be an art and had become a full-fledged member of the chemical process industries, mainly because of the advent of the synthetic polymers. It was through the efforts to develop synthetic rubber that our knowledge of polymers grew, he said.

For example, he pointed out that accurate treatment of molecular weight measurements dates back only 10 years, precise interpretation of X-ray data about 15 years, and reliable infrared spectroscopy only five years. Continued synthetic rubber research will, he believed, further expand the limits of polymer science.

Tracing the routes of future synthetic rubber investigation, he named such possibilities as polymers that will depend less on carbon black for their tensile strength and polymers that would be cast directly into rubber articles from a semi-liquid state without the necessity of breakdown processes, such as the techniques now existing for polyester-polyurethane elastomers.

The Group's officers for the coming term were announced as follows: president, L. W. Heide, Acadia Synthetic Products, division of Western Felt Works; vice president, Albert E. Laurence, Phillips Chemical Co.; secretary, Vincent J. Labrecque, Victor Mfg. & Gasket Co.; and treasurer, Maurice J. O'Connor, O'Connor & Co. Directors from manufacturers include Harold Stark, Dryden Rubber Division of Sheller Mfg. Co.; Bert C. Vandermar, Acadia Synthetic Products; John C. Gallagher, Allis Rubber Corp.; and Bernard A. Kaufman, Lion Rubber Products Co. Directors from suppliers include G. R. Gonyer, Farrel-Birmingham Co.; Edward Wagner, Witco Chemical Co.; Stanley Choate, Tumpeer Chemical Co.; and James Dunne, C. P. Hall Co.

New ASTM Synthetic Elastomers Subcommittee Meets

The new subcommittee 13 on synthetic elastomers of Committee D-11 on Rubber of the American Society for Testing Materials[1] held its first meeting on May 3 at the Hotel Statler, Cleveland, O. This subcommittee was started by inviting nine producers, nine consumers, and nine general-interest people to attend the meeting. B. S. Garvey, Jr., Sharples Chemicals, Inc., was appointed chairman, and L. V. Cooper, Firestone Tire & Rubber Co., secretary, by the advisory committee of D-11. Twenty-two representatives of the various interests and three guests attended the meeting.

In his introductory remarks Dr. Garvey reviewed some aspects of the government synthetic rubber program that were considered of interest to subcommittee 13 and stated that the subcommittee's function was to furnish the organization whereby voluntary standardization could replace government standardization to whatever extent found desirable.

After considerable discussion the scope of the new subcommittee was defined as follows:

"This subcommittee shall be responsible for the development and standardization of test methods, nomenclature and specifications relating to synthetic elastomers and their latices."

Six sections were organized on a functional basis, with the chairmen indicated, as follows: (1) Sampling, L. G. Mason, B. F. Goodrich Co.; (2) Chemical Tests for Solid Polymers, B. C. Pryor, Goodrich-Gulf Chemicals, Inc.; (3) Physical Test Methods for Solid Polymers, L. V. Cooper; (4) Latex Test Methods, L. D. Patterson, Goodyear Tire & Rubber Co.; (5) Nomenclature, R. G. Seaman, RUBBER WORLD; (6) Reference Materials, S. R. Doner, Raybestos-Manhattan, Inc.

A special task group headed by D. Pratt, U. S. Navy, Bureau of Ships, was appointed to determine if "Government Specifications for Synthetic Rubbers," of the Federal Facilities Corp., dated April 15, 1955, will continue to be available in booklet form and in sufficient number of copies to be used as the basis for information and development of certain of these specifications as ASTM standards.

Six specifications from the above-mentioned government booklet covering: (1) moisture by the hot mill method, (2) ash, (3) carbon black in masterbatch, (4) bound styrene in butadiene-styrene rubbers, (5) Mooney viscosity, and (6) properties of vulcanizate, will be reviewed by the sections of the subcommittee and, if possible, recommended to Committee D-11 in Atlantic City, N. J., June 30, at the annual meeting of ASTM for adoption as tentative standards.

[1] RUBBER WORLD, Mar., 1955, p. 782.

Boston Group Contest

The Boston Rubber Group is sponsoring a prize contest for original technical papers submitted by members of the organization. Any subject may be chosen, but the papers should not exceed 30 minutes when presented orally. First and second prize winners will receive $50 and $25, respectively. The two papers will be delivered at the Group's March, 1956, meeting. Judges for the contest will be John Blake, C. C. Davis, and Arthur Ross.

Newton Joins RW Editorial Board

Edwin B. Newton, manager, polymerization utilization research at the B. F. Goodrich Co. Research Center, has joined the Editorial Advisory Board of RUBBER WORLD as of June 1.

Mr. Newton received an A.B. degree from the University of Missouri in 1923 and an M.A. degree from the same university in 1925, where he majored in chemistry. He has been with The B. F. Goodrich Co. since 1925, where he first worked in the general and research laboratories, next became a tire compounder, and then did research in latex and vinyl resins. From 1934 to 1941, Mr. Newton was resident director of the Malayan research laboratories of the company in Kuala Lumpur, F. M. S. Upon his return to the United States he was made director of technical service research, which position he held until 1954, when he was appointed to his present post.

The new board member belongs to the American Chemical Society, American Association for the Advancement of Science, Alpha Chi Sigma, Sigma Xi, and Lambda Chi Alpha. His achievements included publications in the field of natural rubber processing and curing and in vinyl resin and synthetic rubber research.

Mr. Newton will advise the editor in the fields of the chemistry of rubber, both natural and synthetic, as well as in the field of their utilization, which is his special activity at the present time.

Edwin B. Newton

Fort Wayne Hears Panel On Fast Curing Techniques

"Fast Curing Techniques" was the subject of a symposium at the April 14 meeting of the Fort Wayne Rubber & Plastics Group held at the Van Orman Hotel, Fort Wayne, Ind. The three-member panel and their topics included Edward Wray, Belden Mfg. Co., "Manufacture of Wire by the Continuous Vulcanization Process"; Hugh Bethell, R. T. Vanderbilt Co., "Acceleration for Fast Cures"; and John M. Bierer, Boston Woven Hose & Rubber Co., "The Rotocure Process." Members and guests numbered 178.

Mr. Wray discussed the application of the cross-head tuber to the continuous covering of wire with an insulating jacket of vulcanized rubber. Speeds of application and vulcanization up to 700 feet a minute have been developed, he said.

Cool mills and careful attention to heat history can alleviate the problem of rapid curing, Mr. Bethell pointed out. Wire compounders are able to work with stocks having a cure rate of 5-10 seconds at 390° F. Scorch rates, by proper selection of accelerators, such as combinations of Altax, dithocarbamates, Unads, and Tuads, and particularly the newer Cumates and Bismates, can be 15-20 minutes to a five-point rise in a Mooney viscosity at 250° F., which is considered safe for factory use. The use of the Mooney raw stock viscosimeter in evaluating the scorch rates of various rubber formulations at different temperature levels was described.

Mr. Bierer traced the development of the Rotocure machine for producing jointless flat products in vulcanized rubber, plastics, or composite materials. Full development had to await the availability of continuous steel belts with which to maintain pressure upon the product as it goes around the curing drum, he said. Products such as belting, matting, packing, and coverings, embossed with colored patterns, are now being made by the machine.

The Group's newly elected officers include: Jack L. Carlson, Paranite Wire & Cable Co., chairman; Maury J. O'Connor, O'Connor & Co., vice chairman; and John Dixon, Anaconda Wire & Cable, secretary-treasurer. Named to the board of directors were Harold Anderson, General Tire & Rubber Co.; Don Sprott, Auburn Rubber Co.; Reed Williams, Dryden Rubber Co.; Maurie Jones, Marbon Corp.; Gerald Gonyer, Farrel-Birmingham Co.; and Tom Pollard, Monsanto Chemical Co.

A total of 322 members was announced for the organization.

ASME Rubber & Plastics Division Program on Adhesives

The Rubber & Plastics Division of the American Society of Mechanical Engineers will present a one-day program on adhesives at the semi-annual meeting of the Society in Boston, Mass., at the Statler Hotel during the week of June 19. The Rubber & Plastics Division program, consisting of two half-day technical sessions, will take place on June 20 and is co-sponsored by the Wood Industries Division. Gordon B. Thayer, Dow Chemical Co., is chairman of the Division, and the secretary is R. G. Seaman, RUBBER WORLD. Anyone interested in the programs of the meetings of the Society and its Rubber & Plastics Division is welcome to attend these meetings whether or not he is a member of the Society.

The titles and authors of the papers to be given at this Rubber & Plastics Division meeting are as follows:

"Fundamentals of Rubber to Metal Adhesion." D. M. Alstadt, Lord Mfg. Co.

"Stress Distribution and Design Data for Adhesive Lap Joints between Circular Tubes." James B. Lubkin, Midwest Research Institute, and Eric Reissner, Massachusetts Institute of Technology.

"A New Concept of Adhesives." Selby Skinner, Case Institute of Technology.

"Heat Cured Resin Adhesives." Carl F. MacLagan and C. C. Booth, Borden Co.

"Adhesives—A Third Dimension in Fastening and Joining." Richard S. Piper, Minnesota Mining & Mfg. Co.

"Adhesive Bonding of Metals." Samuel N. Muchnick, Franklin Institute.

"The Role of Temperature and Pressure in Bond Strength of Adhesives." Frank Moser, Pittsburgh Plate Glass Co.

"Marbond." Glenn L. Martin Co.—A sound, color movie.

A. C. S. Award to Holmes

Harry N. Holmes, emeritus professor of chemistry at Oberlin College and former president of the American Chemical Society, has received the James Flack Norris Award of the Society's Northeastern Section for outstanding achievement in the teaching of chemistry. The award, consisting of a medal, a scroll, and about $1,000, was presented at the Section's biennial award dinner at the Massachusetts Institute of Technology, May 12.

In his acceptance speech, Dr. Holmes predicted the discovery of a substance which will combat the harmful effects of radioactive fallout. He also lauded the growth of this country's strategic materials stockpile and saw the recent synthetizing of natural rubber as a step toward the strengthening of our economic position in case of war. In addition, he urged acceptance of asphalt-rubber roads.

Collier on Quality Control

"Modern Quality Control" was the subject of an address by S. Collier, director of quality control, Johns-Manville Corp., New York, N. Y., presented before the Philadelphia Rubber Group at the Poor Richard's Club, Philadelphia, Pa., April 29, and supplemented by a motion picture in color. Members and guests in attendance numbered 133.

Essentially similar to a discussion of the field Mr. Collier gave before the October 16, 1953, meeting of the New York Rubber Group,[1] the talk outlined the history and development of statistical quality control, quoted the views of two prominent industrialists on the individual worker's contribution to the furthering of quality control, and analyzed one case history which demonstrated how productivity and profit were increased through quality control.

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[1]See RUBBER WORLD, Nov., 1953, p 226.

Details of Akron Symposium on Plastic and Rubber Foam—II*

Isocyanate Foams

W. H. Ayscue
E. I. du Pont de Nemours Co., Inc.

Photo by Koehne

William H. Ayscue

The most recent newcomer to the family of foam products is a group of materials commonly referred to as isocyanate foams.[1] Made by reacting a diisocyanate with a polyfunctional resin such as an alkyd or polyester, isocyanate foams offer a wide range of properties and almost infinite variety in physical form. Their outstanding characteristics include excellent ozone resistance, as well as good resistance to abrasion, aging, many chemicals, and certain organic solvents.

In making isocyanate foams the isocyanate, alkyd resin, water, and catalyst may be mixed in one step, and the two chemical reactions theoretically involved carried out simultaneously. An alternate method is first to react the isocyanate with the alkyd resin under controlled conditions to give an isocyanate-terminated compound; water and catalyst are then added to this compound to produce blowing and setting.

One advantage of the two-stage method is that part of the heat of reaction is dissipated prior to foaming. This condition permits better control, particularly of foam density and cell structure. Another advantage is that it reduces the hazard of exposure to isocyanate vapors during the foaming operation.

Isocyanate reactions call for careful control of raw materials and reaction conditions. The polymer should form rapidly enough to trap the gas in small bubbles as it is evolved. The amount of water is also critical; so its presence in any of the raw materials, even in traces, must be known and compensated for in the recipe. This point means, too, that all ingredients must be protected from moisture in handling.

Another important consideration in working with isocyanates is toxicity. Toluene diisocyanate, which appears to be the most attractive isocyanate from the standpoint of availability, performance, and cost, is a lachrymator. It will also cause dermatitis in contact with the skin, and its vapors irritate the respiratory tract. Du Pont's medical division requires the company's laboratories to hold isocyanate vapor concentration below one-tenth part in a million.

The field of applications for isocyanate foams is still in its infancy. The foams are new today and have not yet been completely evaluated by their potential users.

But the science of chemical architecture is making fast progress, and the infant is destined to grow.

[1] Rubber World, Mar., 1955, p. 765.

Phenolic Resin Foams

Robert Courtney
Bakelite Corp.

Robert Courtney

Bakelin's great invention covered by his heat and pressure patent was simply a way to tame phenolic foams. What happens during phenolic resin foaming? When phenol and formaldehyde react together, a condensation occurs, resulting in the release of a molecule of water at every point of reaction. The reaction is exothermic. A resin is formed, at first of a syrupy consistency, but becoming more viscous as heating continues until the material jells and hardens.

A second effect is the liberation of water and its vaporization and expansion. Eventually the system reaches equilibrium when the pressure of the expanding steam is balanced by the resistance to deformation of the thickening resin. A peak in the evolution of heat is arrived at, and the temperature begins to fall. If the resin has jelled and hardened so as to resist collapse, the cooling foam will retain its approximate size and shape.

From this description it is quite apparent that to produce foam of the lowest density we need to start with a resin of low viscosity in order that it can expand rapidly. For heavier densities, we start with more viscous and less reactive resins. The viscosity is regulated in the manufacture of the resin; the reactivity, by both the basic structure and the choice of foaming catalysts.

The process, however, is too hard to control for foamed-in-place home insulation applications. In commercial operation it has proved practicable to manufacture the product in large cubically shaped pieces. These can be cut with a bandsaw. Theoretically, the process would be more efficient the larger the block of foam made at one time because there is always a thin, but appreciably high-density non-cellular material on the surface which represents a loss. Cubical pieces, five feet on a side, have been found to be most readily manufactured.

All this is old information, but we now have something new in cellular plastics. This is produced from tiny, hollow plastic bubbles developed first by the Standard Oil Co. of Ohio and sold under the name of Microballoons. They were designed to reduce loss by evaporation of crude pe-

*Concluded from our May issue.

troleum stored in cone-roofed tanks. Bakelite is a licensee to produce and sell Microballoons. Another use for this material is as a low-density filler for plastics. This use amounts to making a foam or cellular plastic, not by expanding a mass of material into a foam or sponge, but by expanding material into separate and discreet bubbles and then bonding them together again. Such cellular composite foams we call Syntactics.

The first Microballoons produced commercially were made of phenolic resin. I believe there are some now on the market made of urea resin, and they may be made from practically any plastic. The Syntactic foam may be stuck together with almost anything that will adhere and dry or harden, for example, glue, dextrin, or starch.

It is difficult to make Syntactic phenolic foams of much lower density at this time. The Syntactic method has several obvious advantages over the old foaming procedure. We can now mix Microballoons with a binder or matrix material to dry or harden at almost any rate we choose. This gives us enough time to pack the putty mixture into the most intricate spaces, or sandwich it between the skin membranes of reinforced plastic or low-pressure laminate stock, and harden the whole assembly at one time.

Microballoons are quite spherical in shape, as contrasted with the polyhedral shape of the cells in a true foam. The sphere is, of course, an ideal engineering structure. Microballoons are all closed cells. About half the phenolic foams made contain connected cells. Other materials added to a foaming mix foam made in the ordinary manner tend to retard the expansion of the foam. In a Syntactic foam, the expansion is done in advance; so other materials such as glass or other fibers can be added for reinforcing the structure without changing the degree of expansion. The economy of using Microballoons in such structures is good. This is, by the way, the first public discussion of this Microballoon concept.

Styrene Foams

William Schock
Dow Chemical Co.

William Schock

Polystyrene, expanded by Dow, is best known under its trade mark, Styrofoam (R). It is made by melting polystyrene granules and mixing them with a blowing agent under pressure. This mixture is released into a normal atmosphere at which time the blowing agent expands the polystyrene approximately 40 times and cools it into a rigid structure having a closed cell system.

Styrofoam 22 is white in color; while Styrofoam 33 is tinted blue. The latter is classed as a self-extinguishing plastic under conditions of ASTM Test D635-44; while Styrofoam 22 will burn at the rate of 7-8 inches per minute under conditions of the same test. Styrofoam 22 will withstand continuous exposure to temperatures up to 175° F.; while Styrofoam 33 will stand temperatures up to 155° F. Log form Styrofoam ranges in density from 1.3 to 1.7 lb./ft.^{3}. Its cell size ranges from 0.8 to 2.5, and its minimum compressive strength is 10 psi. Rough plank and board form Styrofoam ranges in density from 0.5 to 1.5 mm., and the minimum compressive strength is 16 psi.

Thermal conductivity of Styrofoam is .26 BTU/hr./ft.^{2}/in./°F. at a mean temperature of 50° F. and is .13 BTU/hr./ft.^{2}/in./°F. at a mean temperature of —240° F. All forms of Styrofoam are resistant to water and water vapor, as is the parent material, and it has no capillarity because of the closed-cell system of the foam.

Styrofoam is easily fabricated by power or hand-operated cutting tools and by means of electrically heated wire. This material can be heat formed in low-cost dies. Applications include buoyancy mediums, display materials, novelties, insulating and shock absorbing packaging materials, core for sandwiches of other materials, and low-temperature insulation.

Questions and Answers

Q. Synthetic rubber has replaced large quantities of natural rubber in tires, tubes, mechanical goods, and other applications. Some small quantities of synthetic rubber latices are used in foamed rubber. Why hasn't the quantity used in foamed rubber approached that used in the dry rubber applications?

A. Rogers. Actually, the quantity isn't small. Synthetic rubber will account for about 35-40%, which is no small proportion. Here is one reason why it hasn't gone further along. Dry unvulcanized synthetic rubber of the GR-S type has low stress-strain properties—about 300 psi. and 200% elongation—but the hot rubbers I am talking about, when reinforced with carbon black, have enormously increased values. On the other hand, carbon black added to latex has no reinforcing effect on the vulcanizate. In fact, it acts as a diluent because synthetic latex has no crutch, such as carbon black, on which to lean. The latex chemists have not been able to adapt it as did the dry rubber compounders to tires, tubes, etc. The cold latices, with inherently higher physical properties associated with the vulcanizate, have been a major step in the right direction. Latex foam consisting of 100% synthetic made with these cold latices is now being produced.

Q. What are the characteristics required for synthetic rubber latex to be used for foam?

A. Rogers. For latex foam rubber a synthetic latex must have high solids, relatively low viscosity, and the vulcanizate must have good stress-strain properties. The cold synthetic latices have advanced in this direction. However, the cold synthetics now being used in latex foam have too high a percentage of non-rubber materials contained in them. A foam producer does not want to buy 11 to 12 pounds of salts, soaps, surface-active materials, and so forth, for every 100 pounds of rubber. This is one of the factors that enter into the "weight penalty" so commonly complained about by foam producers, where synthetic latex could be improved. In fact, it's the number one place where it should be improved, and they have advanced in this direction. Some of the recent cold synthetic latices have been made with less non-rubber materials in them such as a surface active material.

Also, of course, in the synthetics we would like to have better stress-strain properties, tensile, and elongation, for they are still inferior to the natural rubber latex in those respects. They are, however, better in aging, especially in long-term aging.

Q. What foaming agents are used for the chemically blown PVC's?

A. Manring. The most common for PVC sponge and foam are dinitro-sopentamethylene tetramine (Unical N.D.), p, p'oxy bis (benzene sulfonyl hydrazine) (Celogen OT), BL-353, and BL-425 (du

Pont, composition undisclosed), and azo di-isobutyronitrile (Porophor N), the latter largely discontinued in this country because of toxic results.

Q. What problems are presented in adhering or combining various foams in their industrial applications?

A. Schock. Certain problems are presented in adhering foamed polystyrene. Because of Styrofoam's resistance to the passage of water vapor, a water soluble adhesive cannot be used except in a spot application. Adhesives which may have a solvent attack on polystyrene are to be avoided. In industrial applications, such as in low-temperature rooms, Portland cement mortar which chemically sets is an excellent adhesive. We find also that epoxy type resins provide good adhesion to metal, wood, and other substances.

A. Ayscue. Normally, with isocyanate foams, adhesion is no problem with any type of clean surface. As a matter of fact, trying to prevent adhesion is the biggest problem. Isocyanate foams will stick to such materials as "Hypalon," aluminum, steel, wood, concrete, cotton, wool, Dacron, nylon, and others, particularly those materials from which molds are made. Isocyanate seems to have an excellent adhesion with rubber molds that we have made.

A. Courtney. I think we can deceive ourselves about whether we have or haven't good adhesion in the rigid type of foam, particularly where they're used in structural applications. If you take a sandwich structure and you load it in flexure, tremendous sheer stresses are set up next to the skin. This is a reinforced plastic skin, and the failure will ordinarily occur there, but anything that will adhere to the skin member will adhere to the foam. The ideal thing to do is to reinforce your foam gradually from center to skin. If you build up a Syntactic foam, you can put in fibers and distribute them non-uniformly so that you have the greatest reinforcement at the skin and the least at the neutral axis. Then adhesion, or what is often mistaken for lack of adhesion, will cease to be a problem.

Q. One of the most important problems of the foamed rubber is said to be the slow heat transfer through the jelled foam during vulcanization. Are there any reasons other than cost why prevulcanized latex cannot be employed?

A. Rogers. Actually, some degree of prevulcanization is given the latex in the two major processes that make latex foam. The reason you cannot go to complete vulcanization is that the particles lose their cohesive force, resulting in a weak structure. Also, stress-strain properties are decreased. A slight degree of vulcanization does help, but you cannot go beyond a certain point.

Q. What have been the results of experiments with PVC's and extender pigments?

A. Manring. Such experiments have been mostly restricted to the chemically blown, atmospherically expanded PVC. Generally, carbonates and clays have no marked effect on the quality of the foam up to about 20 parts per 100 of resin other than the fact that there's been a tendency to coarsen the cell structure. Beyond 20 parts, expansion becomes more difficult. Wood flour as a filler seems to promote extremely fine cell size.

A. Ayscue. Fillers in isocyanates produce a high-density foam, and there's no real economy in using them.

Q. Regarding soft foams, how do the compression modulus curves at various deflections compare for latex, PVC, and isocyanate foams?

A. Rogers. They are very similar for vinyl and latex and go up proportionately as the density is increased. Latex is better than vinyl, for we have been able to get higher compressions at lower density. The polyester-isocyanate foams have a different type of compression curve. They go straight up and then flatten off. Some people think this is an advantage for cushioning, and others do not.

Q. Could you describe the process of extruding expanded polyethylene for wire insulation?

A. Courtney. The process consists of dissolving a foaming agent which is ordinarily an organic nitrogen compound in the polyethylene and then introducing the whole mix into an extruder of the type used for extruding insulation over wire. The temperature of the mix in the extruder is raised until it decomposes the foaming agent, but holds it under sufficient pressure to repress the expansion of the released gas until the mass emerges through the nozzle around the wire into the reduced pressure of the atmosphere. Here the bubbles are blown and you have a foam-surrounded strand of wire.

Q. Regarding allergy, how do plastic foams compare with latex foam?

A. Ayscue. So far we think isocyanate foams have no allergic effects.

A. Manring. I would say the same is true of PVC foam.

Q. Would you discuss the methods of measuring the resiliency of flexible foams?

A. Rogers. There are no established ASTM or RMA procedures. We use the Van Orman falling-ball method in our laboratory. The foam we tested was one-inch slab stocks, and they were all the same compression, but differed in density. Latex foam, of 100% natural rubber, was about 500% over the vinyl and polyester-isocyanate foam. I don't know if that's good or bad.

Q. Broadly speaking, to what products do each of the basic materials we've discussed lend themselves?

A. Rogers. Latex foam is already established for cushioning applications. It supports combustion, however, and isn't of value in military airplane seating. Also, it doesn't hold up too well under direct light, but this doesn't matter since most latex foam is used with coverings.

A. Manring. Vinyls can be used in products requiring non-flammability and resistance to oils, chemicals, oxygen, and weathering. You can compound vinyl foam for different compression resistance characteristics at a wide range of densities.

A. Ayscue. A very wide variety of products can be made with isocyanate foams, such as reinforcement for metal or Fiberglas panels for construction, thermal insulation of process equipment, refrigerating insulation, household and industrial sponges, carpet pads, shoulder pads, cleaning brushes, and perhaps even toothbrushes.

Q. What is the current economic situation regarding all of these materials?

A. Manring. Vinyl raw materials are in ample supply. Taking 100 parts of resin and 100 parts of plasticizer as a typical starting point, you have resin at 41¢ and plasticizer at 30¢, or a raw material cost of about 35¢ a pound. This is a top cost. As far as capital equipment goes, between $50,000 and $60,000 can buy a plant capable of making 2,500 pounds of foam a day. Increasing that output 50 times might increase the capital investment only tenfold. Processing, involving a comparatively short cycle, is a favorable factor. Waste is modest. Wet waste can certainly be reused.

A. Schock. Polystyrene foam in logs and rough planks is sold at 55¢ a pound. The board form is about 69¢ a pound. I think a decrease in prices is indicated for the foreseeable future.

A. Rogers. The cost of getting into the latex foam business is pretty high. When we discuss the cost of foam, we are talking about buying compression rather than weight, and if you can take advantage of low density to get your high compression, you are ahead financially. With natural latex at 40¢ a pound, we are in a good competitive position. If the need arose, we could go over into all-synthetic in quite a few foam applications.

A. Courtney. Basically, the phenolic materials from which our foams are made are probably the cheapest of the plastic materials on the market today because they've been produced the longest. The cost of converting them into foam, however, varies greatly, depending upon the type of foam being made, its density, and other details. The resins are on the market at prices which range from 30 to 40¢ a pound.

A. Ayscue. Any discussion of the economic picture that affects isocyanate foams is pure speculation because we are dealing with raw materials produced in limited volume, in either semi-commercial or pilot-plant scale. The prices of the raw materials that go into elastic foams are about $1.40 a pound for toluene di-isocyanate, and 60¢ for polyesters. That is a raw material cost of about 80¢ a pound. These foams have a load carrying capacity about double that of rubber foam, at least in the low end of the load deflection curve. Today plastic foams contain a higher percentage of isocyanate than elastic foams. Therefore their raw material cost is higher, about $1 to $1.15 per pound. Within two or three years, the cost of production should fall about 20%.

Q. How large are Microballoons on the average?

A. Courtney. The diameters range between 10-100 microns. We don't have an accurate analysis of the size because we

have so far been completely unsuccessful in fractionating them.

Q. Is there any information on the sound attenuation characteristics of these materials?

A. Schock. As far as foamed polystyrene is concerned, it has little or no sound deadening properties. The sound absorbing ability is just about equal to that of a plaster wall.

Q. How about PVC?

A. Manring. The subject is rather complex because the sound absorption coefficient varies considerably as the frequency. If you look in *Product Engineering*, April, 1953, you'll find quite an extensive report on this subject as far as several varieties of polyvinyl chloride foams are concerned.

Q. And isocyanates?

A. Ayscue. The material is a relatively good sound absorber at certain frequencies.

Q. Will you discuss the problems that might be encountered in Syntactic foaming of an annular section such as the hollow of a steam jacket, and also the relative economics of using a foam phenolic, compared to a foam polyester?

A. Courtney. I think I can do better with the first part than with the second. The problem of foaming an annular section should present no difficulty with the Syntactic foam if you choose a binder which in itself does not give off enough volatile material to cause trouble. Actually, when you mix your foam with the Microballoons and a binder, your foam is made, and you can place it anywhere, and at your leisure.

You can pump it in through an extrusion nozzle, or pack it in with a trowel, and then your hardening operation depends upon the nature of the binder you use. If it's a matter of a heat reactive binder, you have the problem of getting heat into this cellular mass, which is difficult. If your binder is something such as a polyester resin which has been catalyzed, and your accelerator added to it, it will react at room temperature, and you have no problem at all.

Q. How could you be sure that you had completely filled in that section?

A. Courtney. I don't know except that you would have to carefully pack it in a layer at a time and leave no voids.

Q. Getting back to economics, would phenolics be favored over polyesters in a situation like this?

A. Courtney. Yes, because the cost of the foaming phenolic resins is less, and they have been foamed to lower density.

Q. Will isocyanates be available in lower-cost commercial quantities in the near future?

A. Ayscue. Yes, in about 1956.

Q. Is the self-extinguishing nature of vinyl foam a natural occurrence, or does it have to be compounded into it?

A. Manring. It must be compounded into it by proper choice of plasticizers.

MIT Summer Lectures On Colloid Science

A special two-week lecture series on "Colloid Science" for researchers, teachers, and industrial executives will be given during the forthcoming summer session at the Massachusetts Institute of Technology, July 11-22.

Lecture topics will include the historical development of colloid science, the colloidal state, the production of colloidal systems, kinetics of colloidal particles, electrical properties of colloidal systems, surface phenomena, protection and sensitization, dispersion, coagulation and dissolution, the optics of colloidal systems, and industrial applications in such fields as rubber, plastics, food technology, and medicine.

Ernst A. Hauser, professor of colloid science at MIT, will direct the program. Guest lecturers include D. S. le Beau, Midwest Rubber Reclaiming Co.; Eugene Rochow, Harvard University; D. L. Shanklin, Dewey & Almy Chemical Co.; A. G. H. Dietz, MIT; and Alan S. Michaels, MIT.

Registrants may reserve rooms in the Institute's dormitories, and all recreational facilities will be made available. Application blanks may be obtained from the Summer Session Office, Room 7-103, Massachusetts Institute of Technology, Cambridge 39, Mass.

A. C. S. Award to Nutting

Howard S. Nutting, director of the central research index of Dow Chemical Co., Midland, Mich., and an international authority on the systems of naming chemical compounds, was presented with the Austin M. Patterson Award of the American Chemical Society's Dayton Section at the group's biennial award dinner at Antioch College, Yellow Springs, O., May 14.

Dr. Nutting, who has been associated with Dow Chemical for the past 27 years, received a scroll testifying to his achievements in the field of chemical documentation. A noted chemical researcher, he has done work leading to the development of the first experimental scale plant in the United States for the separation and purification of butadiene.

He also contributed to the development of a process for the manufacture of acrylonitrile and has done research on Thiokol rubbers and silicones.

CALENDAR of COMING EVENTS

June 17

Akron Rubber Group. Summer Outing. Firestone Country Club.

Boston Rubber Group. Summer Outing. Andover Country Club, Andover, Mass.

June 19-23

American Society of Mechnical Engineers. Diamond Jubilee. Semi-Annual Meeting. Hotel Statler, Boston, Mass.

June 21

Buffalo Rubber Group. Summer Outing. Lancaster Country Club, Lancaster, N. Y.

June 24

Detroit Rubber & Plastics Group, Inc. Summer Outing.

June 26-July 1

American Society for Testing Materials. Annual Meeting. Chalfonte-Haddon Hall. Atlantic City, N. J.

July 22

Chicago Rubber Group. Annual Golf Outing. St. Andrews Golf & Country Club, West Chicago, Ill.

July 28

New York Rubber Group. Annual Golf Outing. Shackamaxon Country Club, Scotch Plains, N. J.

August 19

Philadelphia Rubber Group. Annual Outing. Manufacturers' Country Club, Oreland, Pa.

August 28-September 1

NAFM Supply, Equipment & Fabric Fair and annual convention. Conrad Hilton Hotel, Chicago, Ill.

September 11-16

American Chemical Society. National Meeting. Minneapolis, Minn.

September 22

Southern Ohio Rubber Group. Fall Technical Meeting. Engineers Club of Dayton, Dayton, O.

October 4

The Los Angeles Rubber Group, Inc. Statler Hotel, Los Angeles, Calif.

October 5-9

World Plastics Fair & Trade Exposition. National Guard Armory, Los Angeles, Calif.

October 7

New York Rubber Group. Henry Hudson Hotel, New York, N. Y.

Chicago Rubber Group.

Detroit Rubber & Plastics Group, Inc.

October 13

Northern California Rubber Group.

October 14

Boston Rubber Group. Somerset Hotel, Boston, Mass.

October 19

Washington Rubber Group.

NEWS of the MONTH

Washington Report and National News Summary

Although the natural and synthetic rubber producing industries are now meeting for the first time in a free, competitive market, actual competition is not expected to become a major factor until 1956.

The International Rubber Study Group in a recent estimate predicted natural rubber output at 1,845,000 long tons and consumption at 1,830,000 tons; synthetic production at 985,000 tons and consumption at 955,000 tons for 1955. The Natural Rubber Bureau estimated a record-high consumption of 1,400,000 tons of new rubber in this country in 1955.

Actual return to the U. S. Treasury from the synthetic rubber plants and their inventories sold to private industry up to May 1 is revealed at $285,832,378.56.

Eight firms have submitted bids for the still-unsold GR-S plant at Baytown, Tex., and sale of this plant to one of them is expected very soon. Several bidders for 447 pressurized tank cars still owned by the government were also reported.

Harvey S. Firestone, Jr., has predicted that the rubber industry is headed for an all-time record year in 1955.

Goodyear Tire & Rubber Co., in taking over two GR-S plants, said it expected a continued increase in use of non-staining synthetic rubbers because of the growing use of light-colored rubber products.

A new pension-insurance contract was signed between Goodyear and the URWA.

Washington Report

By ARTHUR J. KRAFT

Actual Natural-Synthetic Competition in 1956; Record 1955 Use Predicted

For the past half-decade the natural rubber producing industry has been flaunting an open challenge at America's synthetic rubber industry: "Come out from behind the mantle of U. S. Government protectionism," the taunting refrain went in effect, "and let's have it out in the open." Somewhat frayed already, those protective wraps were lifted entirely last month when the synthetic rubber industry, for the first time in history, was technically, at least, meeting natural rubber in a free, competitive market.

As the long-awaited day began to dawn, both sides were buzzing with talk. It seemed to boil down to agreement on at least one point: 1955 is not the year for the showdown, drag-out battle—if one is coming—between natural and synthetic for rubber market supremacy. Both sides, however, are girding for a competitive struggle in 1956 and later. Neither side is ready yet to predict anything like a complete victory, though both agree on the probable shape of the coming struggle. Survival in the long run will depend on improving materials through research, and trimming production costs. On this both agree. Conceivably, both synthetics and natural will find a comfortable niche side by side by successfully employing their known skills to realize their full potentials.

Latest IRSG Estimates

The tip-off on the probable stand-off for the balance of this year came last month out of London, where the management committee of the International Rubber Study Group—the inter-governmental body whose annual meetings had provided the chief forum for past jousts between natural and synthetic rubber producers—came up with some estimates on the statistical position for rubber this year. World production of natural and synthetic in 1955 will exceed estimated consumption by only 45,000 long tons. In other words, if the committee's projections hold up, there'll be an ample market for both materials, a fairly tight supply. Natural rubber, selling at a comfortable 30¢ a pound plus for months past, should be able to sustain that level for a good while yet.

The committee estimated natural rubber output at 1,845,000 tons and consumption at 1,830,000 tons. Synthetic rubber production—outside of Iron Curtain countries—was forecast at 985,000 tons, and consumption—excluding any material obtained from the Iron Curtain countries—at 955,000 tons. But the committee's communiqué, flashed to member governments, cautioned against any hasty conclusion that severe shortages might impend.

Baytown to United Carbon

Rubber Producing Facilities Disposal Commission announced in Washington, May 25, that it had signed a contract with United Carbon Co., Charleston, W. Va., for the sale of the Baytown, Tex., GR-S plant, for $7,153,000, the highest amount offered for the plant.

The sale must be approved by the Attorney General, and Congress has 30 days to review the contract.

Thiokol Chemical Corp. withdrew its bid on May 25, prior to closing of the sale.

"It was agreed," the communiqué reported, "that substantial additional capacity for production of both natural rubber and synthetic rubber would appear available if demand warranted it."

The 45,000-ton balance of supply over consumption requirements will be available for absorption into governmental and commercial stocks, the committee noted.

Unquestionably, the solid demand abroad and particularly expectation of a continuing booming demand in this country are the source of the committee's optmistic forecast for rubber consumption this year. U. S. demand estimates for 1955 are still rising, fed by the continuing high level of auto output and sales. The auto business could and probably will slow down in the second half of this year, but no one is yet rash enough to predict a really sharp downswing. New models will start rolling off the production lines in October, according to present plans in Detroit.

NRB Estimates

Taking all of this into consideration, the Natural Rubber Bureau—listening post in America for the British and Malayan plantation industry—now foresees a record-high consumption of 1.4 million tons of rubber here this year, with the first half of the year accounting for possibly 750,000 tons of it. The 1.4-million-ton total would mark "the largest one year jump in history"—167,000 tons higher than the amount of rubber used in this country last year. Most of the increase will go to synthetics; natural rubber will barely hold its own with 600,000 tons this year, as against 595,000 tons in 1954, according to the Bureau's estimates. After reporting the rosy side, the Bureau sounded the alert for natural rubber producers to start gearing for the "really competitive" struggle with synthetics ahead next year.

Industry sources in this country, it noted, have lifted their forecasts of 1955 consumption by 150,000 since the first of the year, but they've chalked up the "entire increase" for synthetics. The drop in the percentage of the U. S. market taken by natural to 43% in February and March, the Bureau reasoned, "means that at current price differentials, if more synthetic were available, the swing would be even greater. Synthetic production in March at 78,432 tons is at an annual rate of 940,000 tons, and allowing for exports and various initial distribution difficulties in private hands, shows that when private operations become routinized, natural will have to be fully competitive in price to maintain in 1956 anything like the 600,000-ton share expected in 1955. There probably will be no market depressing surplus of total rubbers in 1955 and prices will not reflect true competitive merits of either (natural or synthetic) rubber."

But the handwriting is on the wall for 1956, a year when, if present plans are carried through, U. S. synthetic rubber producing capacity will be raised to 1.1 million tons.

"But in 1956," the Bureau cautioned, "straight price competition seems likely to prevail, and it is not too early for the natural rubber industry to get ready for the really competitive struggle which lies ahead. Present (price) levels are a great help to the economies of the producing areas, but they will do more harm than good if the producing areas do not realize that in all probability they are temporary —and plan accordingly for the more competitive era of the near future."

Baytown GR-S Plant Early Sale Likely; Disposal Then Complete

The government last month pitched in with earnest to end its last tenuous link with the massive synthetic rubber producing industry to which it gave birth a dozen years ago. It began negotiations with eight firms and one individual who had entered bids to buy the 44,000-ton-a-year GR-S copolymer plant at Baytown, Tex., and with 11 others who are seeking to buy or lease the 447-car fleet of pressurized rail carriers used by the rubber program for more than a decade past.

Transfer Payment Details

Those bids were opened midnight April 29, after the Rubber Producing Facilities Disposal Commission wound up an eight-day spree of raking in dollars for Uncle Sam. In that period 24 rubber plants were formally turned over to private ownership, and another leased. In the disposal package, too, was a miscellany of items, such as raw materials in the plants at the time of transfer. The total yield from the sale was \$285,832,378.56—of which \$264,660,506.42 was paid in cash on the barrel, and the rest owed under 10-year government purchase money mortgages, at 4% interest per annum. Of the former figure, \$259,529,000 represented the value of fixed capital assets, as of August 31, 1954, in the 24 plants (see table). The Baytown plant and the tank cars, if and when sold, will add several more million to this total, wiping clean every cent of public investment in the rubber program since its inception. Their sale will give the nation's taxpayers something over 100¢ return on each dollar remaining in the program as of last August.[1] This amount does not include the operating profits made by the government since that time. It is now estimated that the rubber program, from last July 1 until its termination 10 months later, yielded about \$60 million, and perhaps more, in net profits, higher than in any comparable period.

Baytown Plant and Tank Cars

The Baytown plant and the tank cars are being offered for sale for the second time, having failed to attract satisfactory purchase offers in the previous go around which saw the disposal of the 24 other facilities and the three-year lease of the Louisville alcohol butadiene plant. The Commission announced the names of nine bidders for the Baytown plant, but withheld, at least at the start, the names of those bidding for the tank cars. One of the Baytown bidders, Goodyear Synthetic Rubber Corp., withdrew its proposal on May 19, explaining that its primary interest in bidding was to assure that the plant would be transferred to a competent private operator, thus keeping its output continuously available to the rubber consuming industry. Unless sold, the plant would be taken out of production and placed in government standby for a three-year period.

In its statement Goodyear noted that with eight other competent bidders in the field, sale of the plant appeared assured. The company undoubtedly recognized that, having already purchased two other GR-S plants with a combined capacity of 114,000 tons, its prospects of being chosen to take over a third plant were slim. The law authorizing sale of the Baytown plant requires that the purchase be approved by the Attorney General as consistent with the anti-trust laws. With Congress anxious to see as many rubber plants as possible placed in the hands of smaller firms, it appeared likely that a recommended sale of the Baytown plant to any Big Four company would only invite a Congressional veto resolution.

The eight bidders remaining in contention include no Big Four rubber companies, and only one firm, The General Tire & Rubber Co., which can be regarded as a sizable factor in the tire industry. The seven other bidders are American Resinous Chemicals Corp., Peabody, Mass.; Baytown Rubber & Chemical Corp., Baytown, Tex.; Food Machinery & Chemical Corp., New York; Minnesota Mining & Mfg. Co., St. Paul, Minn.; Thiokol Chemical Corp., Trenton, N. J.; United Carbon Co., Charleston, W. Va.; and Edwin W. Pauley, of Los Angeles, Calif., bidding as an individual.

Of these eight, only Food Machinery & Chemical Corp. is among the 15 companies that already own synthetic rubber plants purchased from the government. General Tire & Rubber is a repeat bidder for the plant, having submitted the sole bid (for \$2,486,448) when Baytown was offered as part of the earlier disposal package. The company continues to operate the plant under contract with the Federal Facilities Corp.

Baytown currently is being run at capacity (about 11 million pounds, gross weight, a month of black masterbatch GR-S); the output is being sold by FFC to consumers. FFC put about \$316,000 worth of capital improvement into the plant between last August 31 and April 30, 1955. Gross book value of the facility as of August 31, 1954 was \$9,884,433; net book value then was \$4,427,224.

Like General, Minnesota Mining and Mr. Pauley were unsuccessful bidders for government rubber plants in the earlier go around. The St. Paul firm and the California oilman-politician had entered bids for facilities at Los Angeles, but were outbid by Shell Chemical Co. American Resinous, Thiokol, United Carbon, and Baytown Rubber & Chemical—the last named formed by local interests only a few months ago for the specific purpose

[1] See our Feb., 1955, issue, p. 653.

ACTUAL AMOUNTS PAID—GOVERNMENT PLANTS PLUS INVENTORIES

Buyer	Product	Annual Capacity Tons*	Sale Price †	Sale Price ‡
Esso Standard Oil	Butyl	47,000	$14,857,000	$15,962,000
Copolymer Rubber & Chemical	GR-S	49,000	5,000,000	11,185,208
	Butadiene	23,000	5,000,000	
Firestone Tire & Rubber	GR-S	99,600	11,650,000	13,136,612
	GR-S latex	30,000	2,250,000	2,846,000
Petroleum Chemicals, Inc.	Butadiene	60,000	16,000,000	18,264,878
Standard Oil of California	Butadiene	§	1,159,000	2,022,404
Shell Chemical Corp.	GR-S	89,000	30,000,000	35,050,132
	Butadiene	61,000		
	Styrene	57,000		
Great Southern Chemical Corp.	Miscellaneous equipment		300,000	300,000
United States Rubber Co.	GR-S latex	22,200	3,200,000	3,966,000
	DDM	1,700	60,000	
Goodyear Synthetic Rubber Co.	GR-S	99,600	11,889,000	13,008,186
	GR-S latex	15,200	2,075,000	2,633,250
American Synthetic Rubber Corp.	GR-S	44,000	2,340,000	3,804,557
Koppers Co., Inc.	Alcohol butadiene	128,000	2,000,000	2,342,317
Phillips Chemical Co.	GR-S	66,000	4,525,000	25,430,712
	Butadiene	71,200	19,100,000	
Humble Oil & Refining Co.	Butyl	43,000	17,500,000	28,523,265
	Butadiene	49,000	8,886,000	
Food Machinery & Chemical Corp. (with Tennessee Gas Transmission Corp.)	Butadiene	78,000	24,187,000	25,869,172
Goodrich-Gulf Chemicals	GR-S	90,000	13,000,000	¶
Texas-U. S. Chemical	GR-S	89,400	11,500,000	
Goodrich-Gulf Chemicals and Texas-U. S. Chemical	Butadiene	205,000	53,000,000	
Totals			$259,529,000	x$285,832,378.56

* GR-S and Butyl in tons of 2,240 pounds; butadiene in tons of 2,000 pounds.
† Fixed capital assets.
‡ Fixed capital assets, plus net additions to plants, raw materials in inventory, components, and miscellaneous equipment.
§ Produces crude butadiene that is purified by Shell Chemical butadiene plant and is included in Shell tonnage.
¶ Goodrich-Gulf paid $41,418,618.82 for the GR-S plant and an undivided half-interest in the butadiene plant.
Texas-U. S. Chemical paid $40,176,454.93 for the GR-S plant and an undivided half-interest in the butadiene plant.
x Total received is about $1 million higher than aggregate of figures (‡) listed for individual companies because of later revision for tax adjustments.

NOTE. All full cash payments, except for following: Copolymer Rubber & Chemical, $3,685,208 down; Great Southern Chemical, $75,000 down; Goodyear Synthetic, $5,185,186 down (both plants); American Synthetic Rubber, $1,727,461 down. In each case, buyer may pay balance in equal annual installments over next nine years.

of bidding for the Baytown GR-S plant—are new entries in the disposal picture.

While the Commission declined to name the bidders for the government tank cars, it did release descriptive information about these properties. All are of the 50-ton class, liquefied petroleum gas, pressurized cars, and were built by American Car & Foundry Co. between October, 1942, and October, 1944. Capacity ranges between 11,541 and 11,633 gallons per tank car. Gross book value as of last June 30 was $2,296,385, and net book value on the same date was $1,173,661. Number of tank cars sought by the various bidders ranged from a low of 10 to the entire fleet of 447 (there were 448 cars when the fleet attracted only a handful of bids last year. One was since destroyed in an accident.

Baytown Sale Deadline

The Commission has until June 29 to wind up negotiations for the Baytown plant and the tank cars. Nothing in the law prevents it from signing the contracts sooner. The Attorney General then gets 10 days to look over the Commission's recommendations and send up his report to Congress. Congress has 30 days in which to review the sale, and, if it lets that period go by without a veto, the contracts take effect. Sales contract for Baytown plant signed May 25, see notice, page 364. [EDITOR.]

Rubber Inventories Sold

FFC, for its part, provided a fairly comfortable cushion to tide over consumers when the bulk of the synthetic plants went over to private ownership in April. For one thing, the agency, dipping into inventory from April 21 on, shipped more than 60,000 tons of GR-S to its customers during April, filling all orders for that month. When the month ended, it was left with some 30,000 tons-plus of GR-S, which was sold to purchasers of 11, GR-S copolymer plants, and about 4,000 tons of Butyl, sold to the two Butyl plant buyers. In addition, the new owners accumulated inventories of some 10,000 tons as a result of continuing production from April 21 until the government stepped out entirely on April 29.

The figures do not include stocks already in the hands of consumers at the end of April. These are estimated at about 50,000 tons for GR-S and about 4,500 tons for Butyl. The government inventory on April 29—which was sold to purchasers of the GR-S and Butyl facilities—brought into the federal treasury some $20 million. That, and a few hundred thousand dollars in federal tax stamps (required to make the contracts legal), brought the total yield close to the $310 million figure forecast by the Commission in its report to Congress last January.

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To Double Hycar Plant

A $2,500,000 expansion of its Louisville, Ky., Hycar rubber and latex plant has been announced by B. F. Goodrich Chemical Co., Cleveland, O. The new production facilities, scheduled for completion early in 1956, will more than double the plant's current capacity.

The expansion is linked with Goodrich's new $8,500,000 acrylonitrile plant now being completed at Calvert City, Ky. Acrylonitrile, one of the basic raw materials needed to produce Hycar rubber, will be shipped from this plant to the Louisville facilities.

National News

Firestone Sees 1955 Record Year

Harvey S. Firestone, Jr., chairman of the Firestone Tire & Rubber Co., predicted in Washington, D. C., on May 4, that the rubber industry is headed for an all-time record year in 1955. This remark was made at the time of Mr. Firestone's arrival in Washington to accept a citation from the Chamber of Commerce of the United States honoring the company for "its outstanding record in favorably representing American business to the general public," and for its contribution to American culture through the simulcast of the "Voice of Firestone."

His optimistic prediction was based on record-breaking 1955 first-quarter tire shipments and rubber consumption. This fact, together with the present strength of the economy, "indicates that production and sales for Firestone and the industry will be the best in history, if there are no serious labor disturbances or major international disruptions," this rubber executive declared.

He estimated tire shipments during 1955 at 104,800,000 units, or 6.5% more than the 98,000,000 tires shipped during 1953, the industry's recent record year. Higher output of rubber products other than tires, especially foam rubber, is expected to continue through the year, and through research in the field of synthetic rubber, new types of rubber will be created and new uses found for those already in existence, it was added.

"The era of the tubeless tire has arrived. It has been adopted as standard equipment for new cars and can be applied for replacement to present wheels and rims to cars now in service. During the year the adoption of tubeless truck tires for general use is regarded as highly possible," Mr. Firestone concluded.

New Goodyear-URWA Pension Contract

A new pension and insurance contract was signed by Goodyear and the United Rubber, Cork, Linoleum & Plastic Workers of America, CIO, in Cleveland, O., May 6.

The contract, effective June 1, for a five-year period includes the following provisions:

1. An increase in pension benefits which will provide pensions averaging $62 monthly, exclusive of Social Security payments. Social Security benefits providing a maximum of $108.50 monthly go into effect July 1, 1956.
2. An increase of $30 a month in disability benefits, making this payment about $80 a month.
3. Compulsory retirement of employes at age 65, beginning February 1, 1957.
4. Sickness and accident insurance benefits increased $5 a week to $40 a week for men and $35 for women.
5. Improvements in hospitalization and out-patient treatment benefits.
6. Continuation of company-paid hospital and surgery insurance benefits for company employes and their dependents.

The new agreement, which will cover about 28,000 Goodyear workers, may be reopened once during the five-year period, but not before February 1, 1958. The entire Goodyear-URWA pension and insurance program is company-paid.

Goodyear Takes Over GR-S Plants

With the signing of the transfer papers in Washington, D. C., in late April, Goodyear Synthetic Rubber Corp. took over a former GR-S plant in Akron, O., devoted exclusively to the production of LTP-type GR-S latex and a GR-S plant in Houston, Tex., which in 1954 was one of the biggest producers of non-staining rubbers. Combined the two plants have an annual rated capacity of approximately 115,000 tons of the synthetic.

The accompanying photograph shows Goodyear president, E. J. Thomas, starting the flow of the first synthetic rubber latex to be produced by the company under private operation in the Akron plant. Also shown in the photograph is R. C. Stell, manager of the plant. Four types of LTP synthetic latex are currently being produced in this plant, which are grouped under the name of Pliolite and will be used in the production of foam rubber.

In Houston, the company will produce regular, LTP, and oil-extended types of synthetic rubber which will be known as Plioflex.

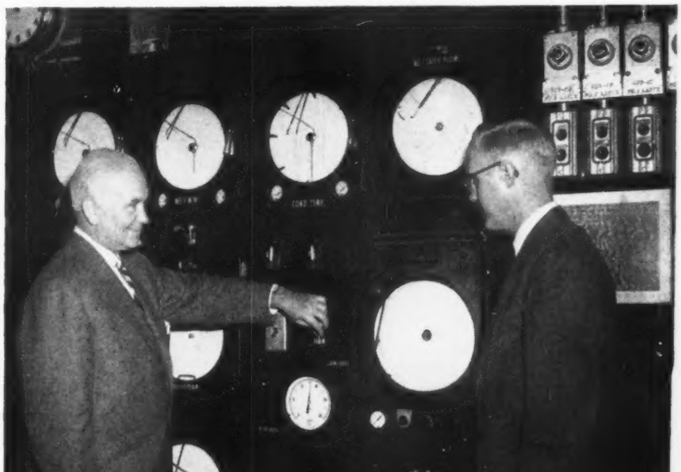
Delivered price of unpigmented, non-oil-extended Plioflex will be 24¼¢ per pound, for quantities of 60,000 pounds or more. The former government delivered price was 24.1¢ per pound. The delivered price of Pliolite synthetic latices will be 28¢ per pound, as compared with the former government price of 27.83¢ per pound on the same basis.

H. R. Thies, general manager of the chemical division, which will handle synthetic rubber sales, explained that the slight difference in price was due to the fact that the government could fill orders from the plant closest to the consumer while private industry will not have this advantage.

Thies said he looks for continued increase in the use of non-staining rubbers because of the growing use of light-colored rubber products. Last year, production of nonstaining types amounted to 101,000 long tons, or 27.1% of total synthetic rubber production, as compared with 94,000 tons in 1952.

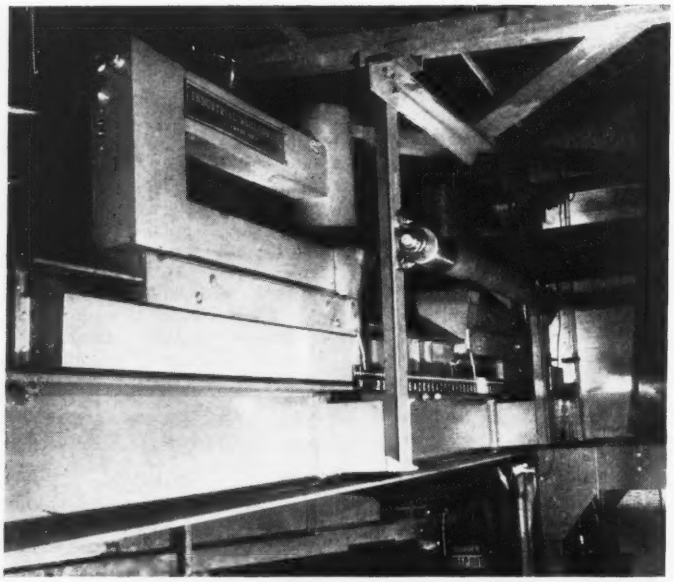
Dalex Named Distributor

Dalex Co., Ltd., has been named Canadian representative for Whittaker, Clark & Daniels, Inc., New York, N. Y., and will distribute the Whittaker line of minerals, colors, and pigments. Dalex maintains offices in Toronto and Montreal and has other resident salesmen in the Maritimes, Brantford, and London. President and general manager of Dalex is D'Arcy F. McConvey.



Goodyear president, E. J. Thomas, and R. C. Stell, plant manager, start private industry operation at Akron GR-S plant

Other Industry News



Portion of the Mansfield Tire & Rubber Co. processing line showing one of the two measuring units of the AccuRay control system

Mansfield Automation System in Coating Tire Fabric

A practical demonstration of automation in the rubber coating of tire fabric has been credited to Mansfield Tire & Rubber Co., Mansfield, O., according to Industrial Nucleonics Corp., Columbus, O., manufacturer of the system that automatically controls the four-roll inverted-L calender used.

The control system, dubbed AccuRay, automatically adjusts the bottom and offset rolls of the calender which simultaneously lay a top and a bottom coating of rubber on the tire fabric. In operation six months, the system is said to have achieved such significant results as improved uniformity of tire fabric, material savings, and more thorough utilization of manpower.

Heart of the AccuRay device are two measuring units which employ radioisotope rays to gage the thickness of the rubber coating. Continuous weight readings are taken and transmitted to a recording strip chart in the central control room. Any variation from weight specification is sensed by the automatic controller, which instantaneously adjusts the coating rolls.

The two nuclear units are across the sheet from each other; each has its own automatic controller, and each monitors its half of the moving sheet. Control action is proportional: the larger the error, the longer the correction time.

The system has built-in safety devices to insure product and process protection. Failure of equipment along the line or the sudden inability of the controller to make abnormal corrections causes an alarm to sound. Automatic control ends, and responsibility over the operation passes into the hands of the operator.

Credit for the installation of the system goes to H. P. Partenheimer, director of research and development at Mansfield Tire, according to Industrial Nucleonics. An authority in tire development, Partenheimer devised what proved to be an effective quality control procedure to get maximum efficiency from the system.

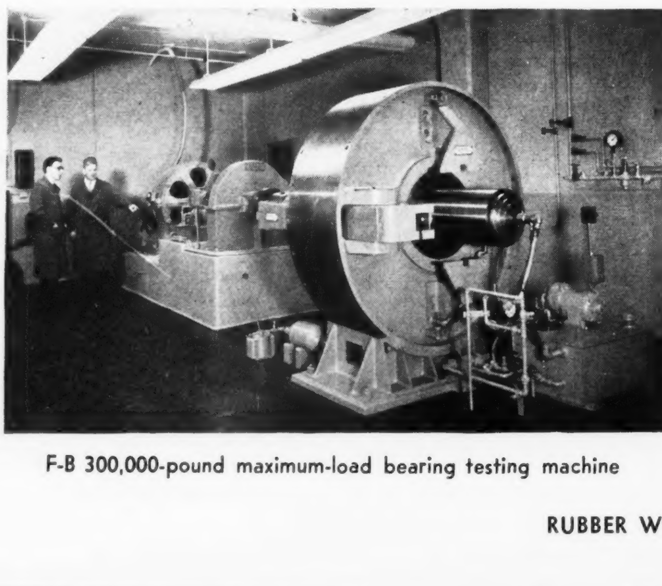
This involves the analysis of the weight readings recorded on the strip charts from the point of view of percentage of material run within the limts of the previously-set target for control action. This information, together with fabric width, total yardage, and specification number, is recorded on a single form and distributed to administrative personnel. Operations add calendering data to this information from shift to shift, resulting in an accurate record of every roll of fabric produced.

American Synthetic Rubber Corp., Louisville, Ky., is building new docks for barge deliveries and installing new production equipment for making several polymers not now being manufactured.

New F-B Test Machine

Farrel-Birmingham Co., Inc., Ansonia, Conn., has installed a new 300,000-pound maximum-load bearing testing machine in its laboratory for the full-scale testing of large plain bearings under simulated operating conditions. Tests will be conducted on bearings commonly used in company products, such as Banbury mixers, rubber and plastics mills and calenders, and rolling and sugar mills, to determine effect of speed, surface finish, journal temperature, and oil viscosity.

The machine has a basic journal size of 14-inch diameter and receives its power through a hydraulically actuated lever system, with actual force measured by strain gage. The main framework is constructed as a circular ring so that the frame can be rotated to apply load from any direction. The driving means for the rotating journal includes a torque meter for measurement of friction torque. Thermocouples are placed in bearing liners to record bearing temperature during tests. The test journal can be heated to mill and calender temperatures.



F-B 300,000-pound maximum-load bearing testing machine

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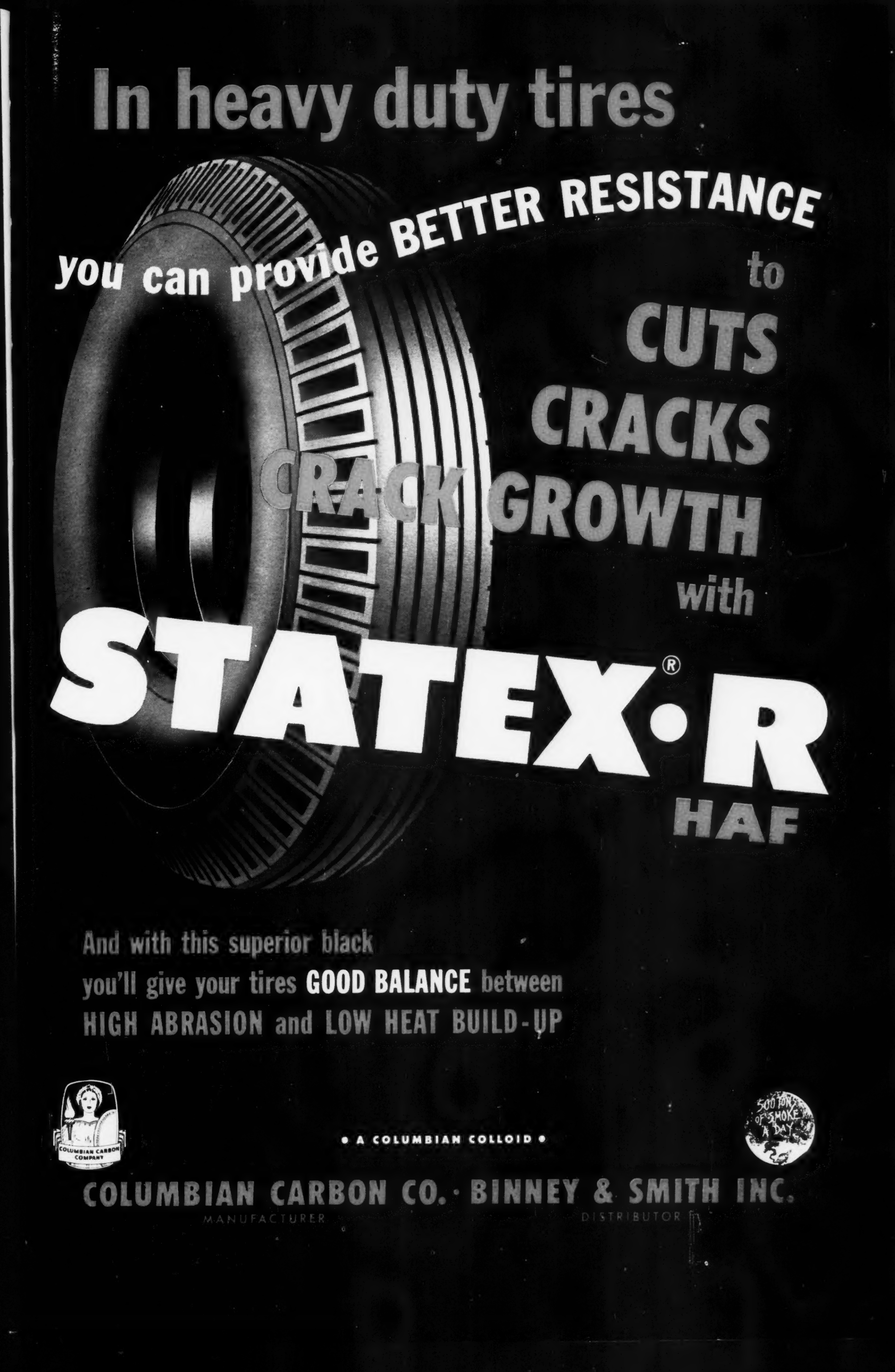
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you'll give your tires GOOD BALANCE between
HIGH ABRASION and LOW HEAT BUILD-UP
COLUMBIAN CARBON COMPANY
• A COLUMBIAN COLLOID •
500 TONS OF SMOKE A DAY
COLUMBIAN CARBON CO. · BINNEY & SMITH INC.
MANUFACTURER
DISTRIBUTOR

3M TV Tape Viewed

Transmission of color television on magnetic video recording tape was demonstrated during the dedication program of Minnesota Mining & Mfg. Co.'s new research center at St. Paul, Minn., May 12. The transmission originated in the New York, N. Y., studios of Radio Corp. of America and was sent through closed-circuit to Minneapolis' Foshay Tower where it was micro-waved to the auditorium of the central research laboratory, first unit to be completed at the center.

Viewing the demonstration were editors and business and industrial executives invited to the ceremonies. The tape, developed by Minnesota Mining, records both the audio and video portions of the original television signal and reproduces them immediately on playback.

Underground Sprinklers

An underground rubber pipe sprinkling system has been placed on the retail market by The Goodyear Tire & Rubber Co., Akron, O. Said to cost 40% below similar metal systems, the outfit is specifically designed for easy installation by the purchaser.

The pipes are inserted into previously planned slits in the earth, 4-6 inches deep. Flexibility of the pipes allows for bypassing of stones, trees, and other objects. The permanent sprinkling heads are level with the ground for safety and will not interfere with the operation of lawn mowers. Seasonal fluctuations in temperature will not deteriorate the pipes, Goodyear claims.

Buys Wright Mfg. Co.

Mastic Tile Corp. of America, New York, N. Y., has purchased Wright Mfg. Co., Houston, Tex., said to be the oldest existing manufacturer of rubber tile and flexible vinyl tile flooring. The acquisition is reported to add $12,000,000 to the annual sales volume of Mastic Tile, making it one of the world's largest producers of resilient tile flooring and wall products.

Wright's assets include its 125,000-square foot Houston plant which employs 200. Its products will continue to be distributed under its own trade name, and the company will operate as a division of Mastic Tile.

President of Mastic Tile is Harry A. Hachmeister.

Osborn Named Sales Agent

C. J. Osborn Co., New York, N. Y., has been appointed exclusive United States distributor for Sachtleben Co., Cologne, West Germany, manufacturer of pure zinc sulfide, 60% concentrated zinc sulfide, and precipitated Blanc Fixe, white pigments for rubber, plastics, and paint compounding. Osborn maintains laboratory facilities in Linden, N. J.

United Votes Debt Rise

An increase in its indebtedness to $15,-000,000 was voted by United Engineering & Foundry Co., Pittsburgh, Pa., at the firm's annual stockholders' meeting. Geoffrey G. Beard, president, revealed that part of this figure will be used to finance a modernization and improvement program costing $9,000,000 over the next two years. Advancement in tool design, need of increased capacity, and confidence in the future were given as reasons for the proposed expansion. All United plants will participate in this improvement.

Financing will be accomplished through a 10-year bank loan.

Directors elected at the meeting include Geoffrey G. Beard, K. C. Gardner, Jr., Harry M. Naugle, Wm. K. Frank, F. L. Dawes, and C. T. Zinsmeister. Officers elected were Mr. Beard, president and general manager; Mr. Gardner, executive vice president; M. P. Sieger, Wm. Hagel, and Clark H. Johnson, vice presidents; George V. Lang, treasurer; Mr. Zinsmeister, secretary; C. W. Rebhun, assistant secretary; and C. W. Correll, assistant treasurer.

The directors declared the regular quarterly dividend of 1¾% on the preferred stock of the company, and a dividend of 20¢ a share on the common stock, both payable on May 17 to stock of record May 6, 1955.

Electric Field Used In Vulcanizing Technique

A patent on a new technique for vulcanizing sheet rubber used in the manufacture of rubber thread has been granted Donald Cockburn and Daniel Rhee, both of Rhee Elastic Thread Co., Warren, R. I. The process is said to eliminate the nonuniform physical properties resulting from previous methods, to do away with discoloration, and enable threads to be made in continuous lengths of more than 500 yards.

The patent, No. 2,703,436, entitled "Method of Vulcanizing Rubber Sheet Material," describes how a vulcanization system is applied to a roll made of alternating layers of uncured sheet rubber and thin insulating material, such as cellophane or glassine paper, which is maintained under adequate tension. The roll is subjected to a high-frequency electric field in an atmosphere heated to the vulcanizing temperature by such means as steam coils. Threads more than 2,000 yards long have been subsequently made.

Existing techniques consist of the simple application of heat to the outside of a sheet rubber roll. According to the text of the patent, this results in an unequal heat distribution, with the outer layer receiving more heat than the inner ones, and the consequent discoloration necessitates the discarding as waste of the outer layer or portions of it. Also, the variations in physical properties caused by this uneven heat distribution weaken and mar much of the cured stock and limit the length of the processed thread.

Seiberling's Sales Gain

Seiberling Rubber Co., Akron, O., has had about a 30% increase in sales for the first quarter of 1955, compared to sales during the similar period last year, J. P. Seiberling, reelected president and chairman of the board, told the recent annual organizational meeting of the firm's board of directors. The company last year reported a loss of $50,907 for the first quarter.

Reelected also at the board meeting were H. P. Schrank, vice president in charge of production; L. M. Seiberling, vice president in charge of sales; R. J. Thomas, vice president and treasurer; C. E. Jones, vice president and comptroller; W. P. Seiberling, secretary; H. E. Thomas, assistant secretary and assistant treasurer; and R. L. Perkins, assistant secretary.

Makes Latex-Backed Fabric

Fabric backed with a coating of synthetic rubber latex has been developed for such textile uses as automotive and furniture upholstery, mattress tickings, handbags, footwear, and similar products, according to The Goodyear Tire & Rubber Co., manufacturer of the Pliolite latex used.

The fabric, made by Burlington Industries, Inc., has a barely visible coating of latex which gives it increased strength and shape-retaining ability. The coating binds the individual fibers in place, reducing raveling and improving tear and snag resistance, even in loosely woven textiles, Goodyear says. The latex is odorless and lightweight.

Thiokol Expands Facilities

Thiokol Chemical Corp., Trenton, N. J., has completed the installation of new equipment that will more than double the production capacity of its Plasticizers TP-90B and TP-95, low-temperature plasticizers for the compounding of GR-S, neoprene, acrylonitrile-type, and natural rubbers and vinyl resins. Recent increased demand for these materials prompted the expansion, the company says.

The design of the stainless-steel facilities is said to represent an engineering advance over former equipment, with lower volatility and better dielectric properties for the plasticizers expected to result.

Hooker, Durez Combine

Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., has been consolidated with Hooker Electrochemical Co., Niagara Falls, N. Y. Hooker's new board of directors will consist of its current eight members plus three representatives from the board of Durez and includes E. R. Bartlett, chairman, J. H. Babcock, E. L. Burnham, H. M. Dent, R. W. Hooker, B. Klaussen, C. S. Lutkins, J. P. Marquand, R. L. Murray, C. N. Osborne, and J. F. Snyder.

U. S. Rubber Breaks Ground for Research Center

H. E. Humphreys, Jr., president of United States Rubber Co., broke ground on May 19, in Preakness, Wayne Township, N. J., for the company's new $4,000,000 research center. In attendance at the ceremony were officials and employes of the company, officials and residents of Wayne Township, and representatives of the trade press. Following the groundbreaking ceremony, Mr. Humphreys explained the reasons for choosing the Preakness site and the purpose of the new research center.

Luncheon was served at the North Jersey Country Club, and S. M. Cadwell, director of research and development for U. S. Rubber, described in some detail the research and development activities of the company which were first housed in a separate building on W. 58th St. in New York, N. Y., in 1913, moved to the present location in Passaic, N. J., in 1928, and will be transferred to Preakness as soon as the new research center is completed.

In his talk Mr. Humphreys emphasized the importance of research to the stockholders, employes, customers, and the nation. Research requires the best scientific talent and the very best facilities and surroundings, and the site selected was considered to be ideal in this respect. It was pointed out that New York City and northern New Jersey have more than twice the number of laboratories found in any other section of the country, and this fact would be of advantage to U. S. Rubber's research workers.

Dr. Cadwell described the growth of research in the rubber and associated industries and explained that the fundamental type of work to be conducted at the new research center is the means by which new products and new processes are developed to commercial significance. He said that such research, which had formerly been concerned mostly with natural rubber and the materials used with it, now embraced synthetic high polymers of rubber, plastics, and fibers. Because of the company's extensive natural rubber plantations in the Far East, however, research in natural rubber polymers will be continued. The new science of atomic energy and its relation to research in the high polymer field will also be studied at the new center.

U. S. Rubber's new research center will consist of three principal buildings: a main laboratory, an experimental laboratory, and a chemical engineering laboratory. The arrangement and architecture of the buildings will suggest a university campus in appearance.

S. M. Cadwell, H. E. Humphreys, Jr., and Harold W. Laauwe, former mayor and official representative of Wayne Township, break ground for U. S. Rubber's new research center

Goodrich Radiation Chamber

A five-ton cobalt-60 radiation chamber will soon be installed at The B. F. Goodrich Co. Research Center, Brecksville, O., for rubber and plastics research, according to F. K. Schoenfeld, Goodrich vice president in charge of research.

The chamber, known as a "pig," has ten inches of lead shielding and is said to be the first such facility existing outside of government atomic laboratories. It was designed by the company's nuclear study team headed by R. G. Bauman in conjunction with the Brookhaven National Laboratory, Upton, L. I., and the Walter Kidde Laboratories, Garden City, L. I., and constructed by National Lead Co., Perth Amboy, N. J.

The device will be loaded with flat slabs of cobalt-60 at Brookhaven before shipment to Brecksville. Materials placed within the chamber will not be made radioactive.

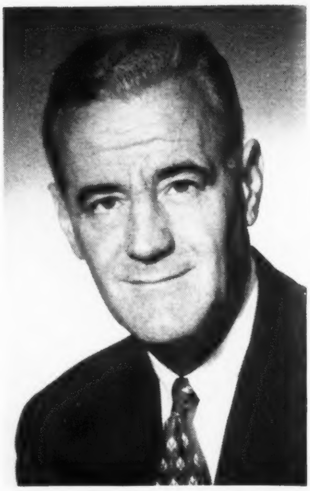
How-to-Invest Show Held

Exhibits portraying the chemical industry's contribution to the American economy were presented by the Manufacturing Chemists' Association at the How-to-Invest Show, sponsored by Merrill Lynch, Pierce, Fenner & Beane, securities broker, at the 71st Infantry Regiment Armory, New York, N. Y., May 24-30.

Featured were the roles played by synthetic rubber, plastics, synthetic fibers, carbon black, and the basic raw materials needed to produce them. The exhibition consisted of descriptive panels, mechanical displays, and end-products.

Purpose of the show was to depict the relation of the American economy to stock market activities.

Participants included American Gas & Electric Co., American Iron & Steel Institute, General Electric Co., General Foods Corp., General Motors Corp., International Business Machines Corp., and the New York Telephone Co.



Wilbur F. Jordan

Firestone Establishes Synthetic Division

A. D. Miller has been named general manager of the new synthetic rubber and latex division of The Firestone Tire & Rubber Co., Akron, O. The division will produce and sell synthetic rubbers, synthetic latices, and related products, as well as natural rubber latices.

C. A. Hill will be production manager of the principal producing plants of the division at Lake Charles, La., and Akron, O., both recently purchased from the government at about $16,000,000. Combined capacity is at 130,000 tons annually.

Also appointed were Wilbur F. Jordan as sales manager, and Robert L. Bebb as manager of research and development.

Mr. Miller first joined Firestone as a chemist in 1934 while still attending college. He was appointed head of the technical division of the Firestone-operated Rubber Reserve plant in Akron in 1941, technical manager for all Firestone-operated synthetic rubber plants in 1943, general manager of these plants in 1947, and was assigned to special executive duties with the company in 1951.

Mr. Hill became associated with the company in 1942 and supervised construction of the government's synthetic rubber producing plant at Baton Rouge, La. Later he joined the management staff at the Port Neches, Tex., synthetic rubber plant operated by Firestone. In 1945 he became manager of the synthetic rubber plant at Lake Charles, La., and two years later was transferred to Akron as general manager of the Lake Charles and Akron producing plants.

Mr. Jordan joined Firestone in 1937 and was assigned to the research division. He worked in the development laboratory of the company's Fall River, Mass., plant from 1938 to 1945, and subsequently returned to Akron where he became manager of the latex and adhesive division in 1947. The following year he was appointed sales manager of that division.

Mr. Bebb joined Firestone's research division in 1938 and in 1945 was put in charge of the firm's synthetic rubber research project.

Enjay Dedicates New Laboratory

Entrance to Enjay Laboratories

Enjay Co., Inc., which markets petrochemicals and Butyl rubber for Esso Standard Oil Co. and Humble Oil & Refining Co., manufacturing subsidiaries of Standard Oil Co. of N. J., dedicated to their customers a new laboratory at the Esso Research Center in Linden, N. J., on May 17. Housing 11 separate laboratories and office space, it will be known as the Enjay Laboratories, and its 40-member staff will conduct research and do technical service on additives for fuels and lubricants, chemical intermediates, and Butyl rubber.

The company also announced that a wing about the same size as the main building itself, which will contain facilities for processing and testing numerous materials and products made from Butyl rubber, was now under construction. A feature of the new laboratory is that it is believed to be one of the first industrial laboratories utilizing only electricity, instead of gas, for heating purposes.

The building was dedicated in brief ceremonies at noon in the auditorium of the main Esso Research & Engineering Co. building on the ground of the Esso Research Center. Miller W. Swaney, director, Enjay Laboratories, presided and introduced Osgood V. Tracy, president; James G. Parks and A. Bruce Boehm, vice presidents of Enjay Co.; and Eger V. Murphree, president of Esso Research & Engineering Co.

Mr. Tracy pointed out that the dedication of the Enjay Laboratories had been planned as part of Chemical Progress Week, May 16-22. He said that the petrochemicals industry, which began in 1920, had grown at a spectacular rate since 1940 with plastics, synthetic fibers, and synthetic rubbers contributing to a very great part of that growth. The outlook for future growth was said to be unlimited, and the hope was expressed that the new Enjay Laboratories would aid the company's customers' progress in this field.

Mr. Murphree pointed out that the location of the Enjay Laboratories on the grounds of the Esso Research Center makes it possible for that laboratory to draw on the main research laboratory for special skills. He mentioned that a cobalt 60 source of gamma rays was being installed at the center for the study of their effect on accelerating chemical reactions.

This portion of the program was concluded with a brief explanation by Dr. Swaney of the facilities and purpose of the various parts of the new Enjay Laboratories, following which the visitors were taken on a tour of the new laboratories and also some sections of the main Esso Research Center building, in which luncheon was then served.

U. S. Rubber Reclaiming Licenses Argentine Firm

U. S. Rubber Reclaiming Co., Buffalo, N. Y., has licensed Fabrica Argentina de Alpargatas, Buenos Aires, Argentina, to use its "Reclaimator" process for the production of reclaimed rubber. C. H. Peterson, president of the Buffalo company, announced at a press conference at the Overseas Press Club in New York, N. Y., May 10.

The Alpargatas company is the first to be granted use rights of the process patent, although Peterson said that his company is discussing licensing arrangements with companies in other countries in South America, Europe, and the Far East. Alpargatas is the largest employer in the Argentine, with some 15,000 employes engaged in the manufacture of textiles and footwear made of both fabric and rubber.

The "Reclaimator" process is a comparatively simple means for producing reclaimed rubber in that it is continuous and requires no steam plant and no washing or drying operations. The usual cracking and grinding equipment for the scrap rubber tires, common to all reclaiming methods, is necessary, but the separation of the fiber is accomplished mechanically rather than by the more lengthy chemical digester process. The finely ground clean scrap rubber is then mixed with devulcanizing agents and solvents and processed in a screw machine at about 350° F. Reclaimed rubber is obtained in a matter of minutes rather than hours by the "Reclaimator" process. The reclaimed rubber may be produced in slab, extruded, or powdered form.

The Alpargatas company will construct a new plant in the Argentine, scheduled to begin operations in January, 1956, with a capacity of 7,000 pounds per day initially and with a potential capacity of 25,000 pounds per day. Machinery and process equipment for the new plant will be purchased in the United States and assembled in Argentina, with technical and engineering data furnished by U. S. Rubber Reclaiming Co.

Also announced at this press conference was a new series of polymeric materials called the Bisonides which are produced from vulcanized rubber scrap as the basic raw material by U. S. Rubber Reclaiming Co. Details will be found in the New Materials department of this issue.

Form Petro-Tex Chemical

Petro-Tex Chemical Corp. has been formed jointly by Food Machinery & Chemical Corp., New York, N. Y., and Tennessee Gas Transmission Co., Houston, Tex., to operate the 90,000-ton butadiene plant at Houston, Tex., recently purchased from the government by FMC.

Gardiner Symonds, president of Tennessee Gas, will be chairman of the board of the new organization, and Paul L. Davies, president of FMC, will be president and chief executive officer. Joseph R. Mares, formerly vice president of Monsanto Chemical Co., will be managing director, and Gordon A. Cain, formerly assistant to the manager of FMC's Westvaco Mineral Products Division, will be vice president and treasurer.

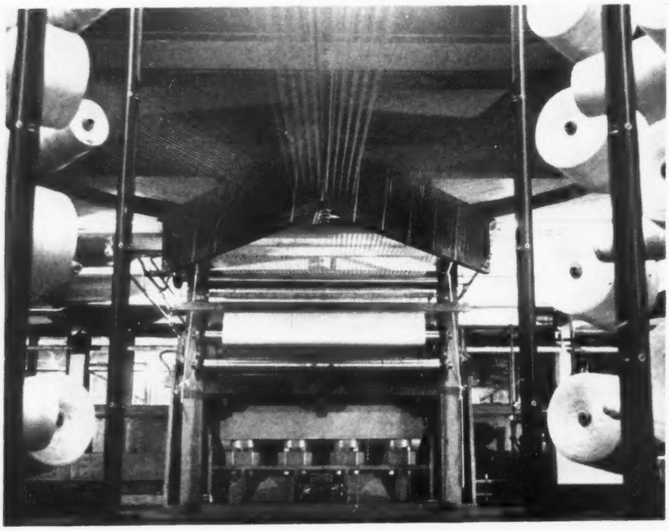
Other officers include R. V. Mertz, vice president; and J. P. Lockwood, secretary and assistant treasurer. The full board of directors consists of Mr. Davies, Mr. Symonds, Mr. Mares, Ernest Hart, Carl F. Prutton, J. J. King, and R. R. Dean.

Testing Firm Expanding

South Florida Test Service, Miami, Fla., has added a 3,000-square-foot laboratory annex to its current facilities and is building an adjacent 75,000-square-foot auxiliary test field. The firm specializes in weathering, corrosion, and sunlight tests on rubber, plastics, textile, protective coatings, paper, and other goods, for both private industry and governmental agencies. The year-round hot and sunny climatic conditions of Florida make for naturally accelerated deterioration tests, the company says.

New Laboratory Annex of South Florida Test Service

New Goodrich Calender Train Boosts Tire Output 20%



Some 2,500 ends of nylon cord gathered in through eyelet board to form 66-inch-wide web at preliminary stage of Goodrich calender train operation

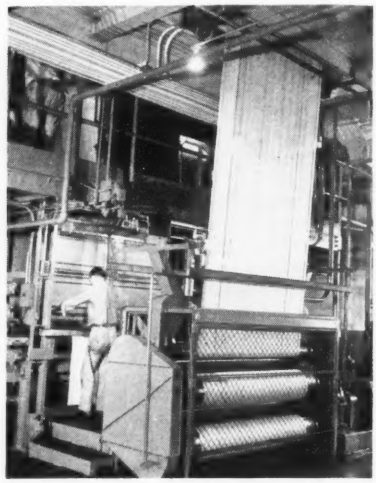
A 20% increase in tire production at the B. F. Goodrich Co. Tire & Equipment Division's Oaks, Pa., plant is reported to have resulted from the recent installation of a huge new calender train that coats nylon tire cord with adhesive and rubber under uniform tension in one continuous process.

Said to be the only machine of its kind in the world, the calender train is controlled by a single operator at a 30-foot-long control panel who oversees the dipping, drying, coating, and winding processes that compose the unit's operations. Cost of the equipment, which occupies a 380-foot long, 34-foot high, 60-foot wide area, is reported at $2,000,000.

The facilities are complete with an inter-operations communication setup, a public address system, an air-sampling device sensitive to hazardous mixtures in the cement dip enclosure, and an automatic CO_2 fire extinguishing system. Near-automation is achieved by devices that shut down the entire calender train in emergencies while annunciator lights on the control panel indicate the trouble source. Measuring and recording units on the panel track the operation's progress.

First function of the calender train is to pass 2,500 strands of nylon cord through an adhesive dip and from there through an air dryer section where the cord is treated at high temperatures and under controlled tension. At the next stage the cord is passed through a four-roll calender where both sides are laminated with rubber while still in a weftless form. Finally, the material is treated with adhesive cement and wound in rolls for the fabric-preparation section.

The finished tire cord is used by Goodrich in the manufacture of truck, bus, off-the-road, airplane, and passenger-car tires, as well as for the so-called shock-shield built into all of the company's heavy-duty truck tires, a reinforcing layer sandwiched in between the tread and plies of the tire.



Web entering calender train through tensioning rolls before adhesive dip immersion

N.S.C. Names 1954 Rubber Industry Winners

Rubber industry safety award winners for 1954 have been announced by the National Safety Council, Chicago, Ill. Competing were 164 plants with a total of 397,400,000 manhours worked, 1% below the manhours worked in 1953. Number of injuries sustained amounted to 1,483, 18% under the 1953 figure. Twenty-three perfect records were registered for the 12 months. The top three winners in each of the five divisions are as follows:

Division I (over 400,000 average monthly manhours worked), United States Rubber Co., Mishawaka, Ind.; The Goodyear Tire & Rubber Co., Gadsden, Ala.; The Firestone Tire & Rubber Co., Akron, O., Plant #1.

Division II (200,001-400,000 average monthly manhours worked), Goodyear, Jackson, Mich.; Firestone, Des Moines, Iowa; Firestone, Bombay, India.

Division III (100,001-200,000 average monthly manhours worked), Goodyear, Akron Plant II; Electric Hose & Rubber Co., Wilmington, Del.; Goodyear, Sweden.

Division IV (50,001-100,000 average monthly manhours worked), six plants tied for first place with perfect records, including Goodyear, New Bedford, Mass.; B. F. Goodrich Chemical Co., Port Neches, Tex.; U. S. Rubber, Port Neches; Goodyear, FFC Plant, Houston, Tex.; Kentucky Synthetic Rubber Corp., Louisville, Ky.; and Copolymer Corp., Baton Rouge, La.

Division V (under 50,000 average monthly manhours worked), 17 plants tied for first place with perfect records, including: The B. F. Goodrich Co. Research Center, Akron; Firestone, Synthetic Division, Akron; Firestone, Christchurch, New Zealand; Goodrich, Reclaim Plant, Akron; McCreary Tire & Rubber Co., Indiana, Pa.; U. S. Rubber, Manchester, N. H.; Goodrich Works Lab, Akron; Firestone, Flotation Gear Plant, Memphis, Tenn.; Goodrich, Du Bois, Pa.; University of Akron, Akron.

Also, The Firestone Plastics Co., Pottstown, Pa.; U. S. Rubber, Burlington, N. C.; U. S. Rubber Reclaiming Co., Inc., Cheektowaga, N. Y.; Firestone, Xylos Plant, Memphis; Canadian Lastex, Ltd., Montreal, P.Q., Canada; Firestone, Retread Shop, Akron; and The Lobl Mfg. Co., Middleboro, Mass.

To be presented certificates of achievement for the greatest numerical reduction in the injury frequency rate are: in Division I, Gates Rubber Co., Denver, Colo.; Division II, Goodyear, Java; Division III, Goodyear, Luxembourg; Division IV, Corduroy Rubber Co., Grand Rapids, Mich.; and Division V, The Pyramid Rubber Co., Ravenna, O.

Saf-T-Miler Tubeless Made

The General Tire & Rubber Co., Akron, O., has introduced its first popular-priced Nygen tubeless passenger tire. Called Saf-T-Miler Nygen tubeless, the nylon-corded tire is said to be in full production at the company's Akron and Waco, Tex., plants in anticipation of heavy demand. Long wear, coolness of running, blowout safety, and easy recappability are claimed for the Saf-T-Miler.

Front view and entrance of National Aniline's new research building, research-engineering center, Buffalo

National Aniline's Research Center Completed

Donald G. Rogers, president of National Aniline Division, Allied Chemical & Dye Corp., announced on May 19 the completion of the company's new research and engineering center at its Buffalo, N. Y., plant. Occupancy of the center by more thn 300 chemists, engineers, and technologists was formally marked by Open House ceremonies, May 19-21. These events coincided with the observance of Chemical Progress Week, May 16-21, by the chemical industry of the United States, and also commemorated National Aniline's seventy-fifth year.

The research and engineering center is a connected two-building facility. Wesley Minnis is director of research, and Forrest J. Krueger is engineering manager. Direct supervision of the two facilities in Buffalo is under B. M. Helfaer, assistant director for research and development, and E. H. Beebe, assistant plant manager, engineering.

National Aniline Division is one of the country's largest producers of dyes, dye intermediates, and synthetic organic chemicals including surface active agents, pharmaceuticals, phthalic and maleic anhydrides, and industrial detergents. Isocyanates, one of the company's latest products for use in the production of synthetic rubbers, foams, resins, plastics, etc., is being made in semi-commercial quantities at Buffalo while a new plant for the production of isocyanates is under construction in Moundsville, W. Va.

Higgins Plant Opened

A multi-million-dollar oxychemical plant has been opened by Hercules Powder Co., in Gibbstown, N. J. Designated the Higgins Plant in honor of the firm's former president, C. A. Higgins, it marks the entrance of Hercules into new fields of chemical processing.

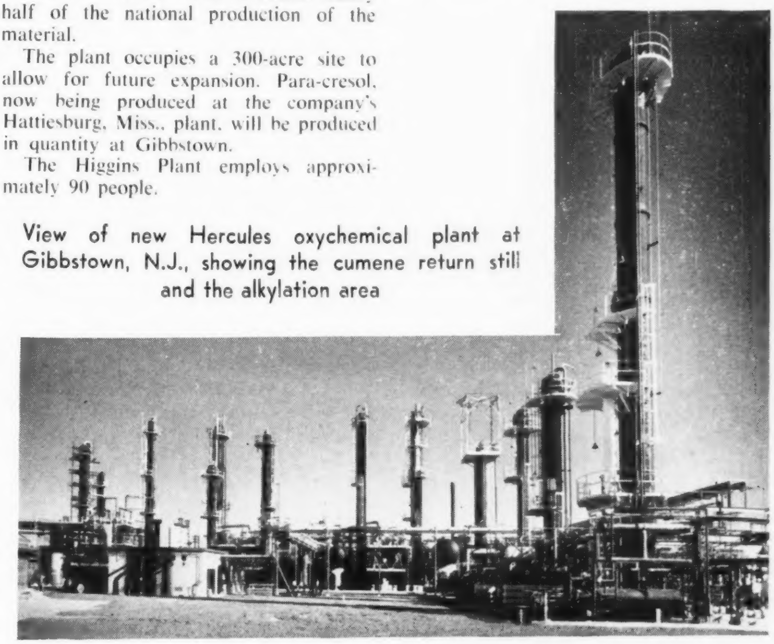
The new facility is designed to produce 26 million pounds of phenol annually, as well as alpha-methylstyrene, acetophenone, and hydroperoxides. Hercules employs the cumene oxidation process, said to be 15 years in development. The company has also acquired U. S. patents on an equivalent process developed independently in England by Distillers Co., Ltd. Dicumyl peroxide for the vulcanization of rubber, recently introduced by Hercules, will be made at the Higgins Plant.

Petroleum refineries and steel mills are a prime source of benzene and propylene, the raw materials used for phenol production. The new plant is expected to become the largest producer of synthetic phenol on the East Coast, which consumes nearly half of the national production of the material.

The plant occupies a 300-acre site to allow for future expansion. Para-cresol, now being produced at the company's Hattiesburg, Miss., plant, will be produced in quantity at Gibbstown.

The Higgins Plant employs approximately 90 people.

View of new Hercules oxychemical plant at Gibbstown, N.J., showing the cumene return still and the alkylation area



New Stowe-Woodward Plant

Its new rubber-roll plant at Griffin, Ga., was formally opened and dedicated by Stowe-Woodward, Inc., May 4. More than 600 guests were reported to have been in attendance, including Herman E. Talmadge, former governor of Georgia; H. L. Cochran, president of the Griffin Chamber of Commerce; and W. E. George, City Manager of Griffin. E. W. Peterson, president of Stowe-Woodward, and Paul Mitchell, manager of the Griffin plant, were also present.

A tour of the plant facilities followed the dedication. Now at full-scale, production at the plant began early this year. According to the company, the rubber-roll covering plant is the most modern in the world and was specifically designed to meet the unusual production flow and work area requirements of rubber-roll manufacture.

Witco Holds Open House

Witco Chemical Co., New York, N. Y., held open house, May 18 and 19, both in celebration of its thirty-fifth anniversary and the opening of its new executive and sales offices in the Chanin Bldg., 122 E. 42nd St. Some 200 guests and employes of the firm attended the affair.

The company also has offices in Chicago, Boston, Cleveland, Akron, Atlanta, Houston, Los Angeles, and San Francisco, and London and Manchester, England.

Scrap Foam Packaging

Packaging units molded from ground scrap foam rubber are proving valuable in the shipping of delicate instruments and parts, according to American Latex Products Corp., Hawthorne, Calif., foam rubber goods manufacturer and developer of the salvage product called "Moldtex."

Scrap foam rubber is ground to sawdust size in a hammer mill, mixed with a small amount of liquid latex, packed in molds of the appropriate shape, and cured in an oven. The design of the mold is dependent upon the shape and the size of the item to be shipped.

Preformed "Moldtex" packages have been used by the Atomic Energy Commission, the military, commercial airlines, and private firms, the company says, with further expansion of such uses expected.

American Latex Products is a subsidiary of Dayton Rubber Co., Dayton, O.

Gas Turbine Race Car

A gas turbine race car with a motor rated at 195 horsepower is being used by The Firestone Tire & Rubber Co., Akron, O., to test tires on the Indianapolis Speedway at speeds rarely attained there. Top speeds, however, will have to await the installation of specially designed brakes, since there is almost no compression factor in a gas turbine engine to reduce speed, and the conventional brakes now in the car are not deemed adequate.

The car was built for Firestone by airmen at Offutt Air Force Base, Omaha, Neb. It weighs 2,200 pounds with complete fuel load. The turbine motor weighs 125 pounds less than most piston-type engines in race cars and does not need a radiator or coolant. The car is capable of acceleration from zero to 140 mph. in five seconds, Firestone reports.

News about People

George E. Holbrook, assistant director of the development department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has been advanced to assistant general manager of the company's organic chemicals department, succeeding **Samuel Lenher**, who has been elected a director, vice president, and member of the company's executive committee.

Ellis B. Gardner, vice president of Hewitt-Robins, Inc., Stamford, Conn., has been appointed general manager of the company's Restfoam Division, succeeding **R. A. Nilsen**, who has resigned. Mr. Gardner has also been elected a director of the company. He was vice president of the Kentucky Synthetic Rubber Corp., when this organization was operating the government plant, and Mr. Gardner aided Tom Robins, Hewitt-Robins president, in the formation of the present American Synthetic Rubber Corp.

Also advanced were **Herman A. Schaefer**, to treasurer, while retaining his position as secretary, and **Austin Franklin**, formerly assistant controller, to controller.

C. A. Stokes, director of research and development for Godfrey L. Cabot, Inc., Boston, Mass., has been elected to the board of directors of the Industrial Research Institute.

Paul H. Wilhelm was named technical service representative for United Carbon Co., Inc., Charleston, W. Va., and will serve the New York, N. Y., and New England areas.

William R. Biggs, chairman of the board of Brookings Institution, has been elected a director of United Carbon Co., Inc., Charleston, W. Va. A vice president of the Bank of New York and a director of the First National Bank of Poughkeepsie, he also holds directorships in Rand McNally & Co. and West Indies Sugar Corp.

Foster G. Garrison and **Chester J. Stroemple** have been advanced by Columbia-Southern Chemical Corp., Pittsburgh, Pa., to director of market research and director of market development, respectively. Also advanced were **Eugene D. Witman**, to assistant to the director of market development, and **Louis B. Taylor**, to manager of pulp and paper development.

William J. Lightfoot has been promoted to chief staff engineer in the central engineering department of Diamond Alkali Co., Cleveland, O.

Walter Platte has been named designer and stylist of all Koroseal consumer goods for The B. F. Goodrich Co. Industrial Products Division, Akron, O.

Albert B. Chesley has been named personnel superintendent of Mobay Chemical Co., New Martinsville, W. Va.

Mark M. Wolff, assistant treasurer of Adamson United Co., Akron, O., has been elected secretary of the firm, retaining his assistant treasurership.

The New York Times

Frank J. Smith

Frank J. Smith, formerly manager of the petrochemical division of American Oil Co., has been elected vice president and general sales manager and a director and member of the executive committee of Pan American Chemicals Corp., New York, N. Y., newly formed subsidiary of American Oil.

Wyman L. Taylor has been appointed San Francisco district sales manager of industrial chemicals for Stauffer Chemical Co., New York, N. Y., replacing **R. N. Nason, Jr.**, who has resigned.

Robert D. Scott, general manager of plants for B. F. Goodrich Chemical Co., Cleveland, O., has been named vice president of manufacturing. Joining the company in 1935, Mr. Scott became technical superintendent of the firm's Akron, O., chemical plant #3 in 1940; plant manager of the Niagara Falls, N. Y., Geon plant in 1941; manager of the Louisville, Ky., Geon plant a year later; and general manager of plants in 1951.

Paul H. Wilhelm

Mark M. Wolff

Robert D. Scott

A. D. Winquist, Jr., and **Marcus French** have been transferred from the new products division of National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y., to the chemical sales department of the company.

Robert J. Koll has been named plant manager of the Greens Bayou plant of Diamond Alkali Co. at Houston, Tex., replacing **Henry S. Curtis,** who has resigned. Associated with the company since 1945, Mr. Koll previously had been a development engineer with Rohm & Haas Co. and B. F. Goodrich Chemical Co.

Edwin H. Ahlefeld, Jr., has been promoted to assistant general sales manager of Farrel-Birmingham Co., Inc., Ansonia, Conn.

Thomas A. McCoy has been appointed manager of the Port Neches, Tex., synthetic rubber plant of Texas-U.S. Chemical Co., and will be responsible for the plant's research program, sales, and production. Since 1950 he had been the plant's factory manager while it was being operated by United States Rubber Co.

Howard A. Bellows, vice president of The General Tire & Rubber Co., Akron, O., and a 30-year veteran of the firm's replacement tire sales department, has assumed new duties in sales development.

F. L. Dawes, president and general manager of Adamson United Co., Akron, O., has been elected to the board of directors of United Engineering & Foundry Co., Pittsburgh, Pa.

Alfred W. Hanmer, Jr., has been appointed vice president in charge of sales of Durez Plastics Division, Hooker Electrochemical Co., North Tonawanda, N. Y. Named also were **Walter H. Prahl,** vice president in charge of research and development, and **Edward W. Mathias,** treasurer.

Howard F. Norman has been named product manager, industrial trades, in the adhesives and coatings division of Minnesota Mining & Mfg. Co., St. Paul, Minn., and **August J. Kochis** has been appointed government representative for the division.

Earl W. Loucks has joined Thiokol Chemical Corp., Trenton, N. J., as technical sales representative.

Edwin H. Ahlefeld, Jr.

F. L. Dawes

Earl W. Loucks

William L. Johnson has been named assistant manager of truck tire sales for United States Rubber Co.'s tire division, New York, N. Y., and is succeeded as supervisor of sales training by **E. B. Reynolds. H. B. Sharer** has been appointed supervisor of distributor training; while **C. W. Maier,** continuing as supervisor of sales personnel, will assume additional duties in an administrative and coordinating capacity.

Edward C. Meisner has been appointed general manager of the Plymouth Meeting, Pa., plant of The Philip Carey Mfg. Co., Cincinnati, O. He was formerly general manager of Avco Mfg. Corp.'s Crosley Division.

E. J. Dailey has been advanced to director of operations, Eastern Hemisphere, of the international division of United States Rubber Co., New York, N. Y. Also promoted are **A. E. Denari** and **E. J. Higgins** to director of Western Hemisphere operations and director of staff operations, respectively. **D. E. Durst** has been named manager of overseas manufacturing and **R. H. Swanson** industrial relations manager for the division.

Charles A. Cary has retired as vice president and member of the executive committee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., after 37 years of service. He retains his position as a member of du Pont's board of directors.

George S. Hannaway has been appointed director of marketing for the overseas division of Monsanto Chemical Co., St. Louis, Mo. He succeeds **J. G. MacDermot,** who becomes assistant general manager for the division.

Joseph G. Davidson, vice president of Union Carbide & Carbon Corp., New York, N. Y., has been presented with the honorary degree of Doctor of Science by the University of Southern California and has been cited for "outstanding leadership in the fields of science and business administration."

James V. McLaughlin has been appointed assistant to the president of American Mineral Spirits Co., Chicago, Ill.

Richard V. Hinman has been advanced to assistant eastern sales manager of the company, succeeding Mr. McLaughlin.

Augustus B. Kinzel has been elected vice president in charge of research for Union Carbide & Carbon Corp., New York, N. Y., succeeding **George O. Curme, Jr.,** who is retiring as vice president of the firm, but who will continue as a director.

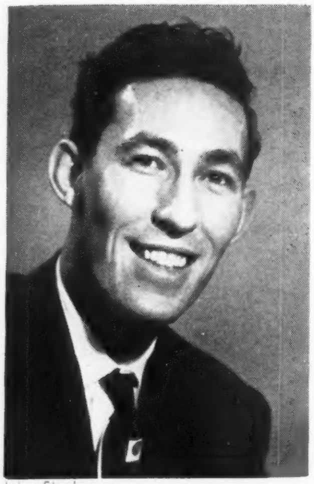
Robert G. Werner has been elected vice president and general manager of Vulcanized Rubber & Plastics Co., New York, N. Y.

M. J. Ross has been appointed export trade manager for both Quaker Rubber Corp. and The Watson-Stillman Co., divisions of H. K. Porter Co., Inc., New York.

A. D. Abshire, H. C. Findlay, J. R. Brady, Jr., and **D. P. O'Connell** have been appointed to the synthetic rubber sales division of Shell Chemical Corp., New York, N. Y., and will make their headquarters in Torrance, Calif. Other company appointments include **B. O. Blackburn,** on temporary assignment to the sales development department; **G. W. O'Brien,** as supervisor, operations; and **H. G. Lauritzen,** as accounting supervisor.

Scheible's Art Studio

William J. Roberts



John Steele

Jean R. Nesbit

William J. Roberts has been advanced to director of research of Pennsylvania Industrial Chemical Corp., Clairton, Pa., replacing **A. L. Ward**, who has retired. **Nicholas C. Gangeni** is now assistant director of research.

Carl E. Bellew has been appointed sales manager of molded and extruded products of the mechanical goods division of United States Rubber Co., New York, N. Y., succeeding **Purdy Miller**, who was named manager of branch sales of mechanical rubber goods. **Edwin C. Reich** has been appointed assistant sales manager of mechanical rubber goods, replacing **George C. Crabtree**, now a special mining sales representative.

H. A. Wiley, Jr., has been appointed manager of belting and packing sales for Quaker Pioneer Rubber Mills, division of H. K. Porter Co., Inc., San Francisco, Calif.

Ralph K. Guinzburg, president of I. B. Kleinert Rubber Co., has been awarded a medal by the New York City USO Committee in testimony to his services to the organization, from which he recently retired as chairman.

William D. McKeever has joined the sales operating department of The B. F. Goodrich Co. Tire & Equipment Division, Akron, O.

Jerome T. Coe, manager of sales development for the silicone products department of General Electric Co., Waterford, N. Y., has been advanced to the position of sales manager of the department.

Harry M. Zimmerman has been appointed general manager of the Newcomerstown, O., plastics division of Seiberling Rubber Co., Akron, O., succeeding **Robert S. Price**, resigned.

Jean R. Nesbit, formerly associated with U. S. Rubber Reclaiming Co. and Continental Carbon Co., has joined Latex & Rubber Co., Inc., Baltimore, Md. He will sell latex and solid rubbers in the eastern U.S.A.

Henry R. Lasman has been put in charge of the new rubber and plastics laboratory of National Polychemicals, Inc., Wilmington, Mass.

Robert A. Christman has been named chief chemist for the New Martinsville, W. Va., plant being built by Mobay Chemical Co., St. Louis, Mo.

E. Duer Reeves, executive vice president of Esso Research & Engineering Co., has been named president of the Industrial Research Institute.

C. T. Robertson has been named assistant district sales manager of the New York, N. Y., office of Columbia-Southern Chemical Corp., Pittsburgh, Pa.

T. P. Brown, treasurer, Hood Rubber Co. Division, The B. F. Goodrich Co., Watertown, Mass., has been elected to membership in the Controllers Institute of America.

George H. Donnelly, chief of surgical service at the United States Army's Camp Gordon, Ga., and a medical corpsman for the past 27 years, has joined the medical staff of The B. F. Goodrich Co., Akron, O.

John E. Sunderland has been appointed vice president in charge of manufacturing, engineering, and personnel for Sam'l Bingham's Son Mfg. Co., Chicago, Ill.

Alvin O. Fuhrmann has been appointed national aircraft sales manager of the adhesives and coating division of Minnesota Mining & Mfg. Co., St. Paul, Minn.

Roy C. Ingersoll, president of Borg-Warner Corp., Chicago, Ill., has been elected chairman of the board, retaining his presidency.

John S. Brice has joined the chemical division of The Goodyear Tire & Rubber Co., Akron, O., as field representative in the southeastern sales territory, with headquarters in Atlanta, Ga.

Edward H. Hindle has been added to the executive board and sales staff of Willow Rubber & Lining Co., Belleville, Mich., where he will specialize in molded rubber parts development, production, and sales engineering. He was formerly with United States Rubber Co.

Samuel Sneath has joined Martin Rubber Co., Inc., Long Branch, N. J., as sales manager.

V. J. Fazio has been appointed assistant sales manager for Tyer Rubber Co., industrial products division, Andover, Mass.

News Briefs

Stauffer Chemical Co., New York, N. Y., will begin construction of a carbon bisulfide plant at Mobile, Ala., with completion expected for mid-1956.

Pennsylvania Industrial Chemical Corp., Clairton, Pa., has opened a West Coast district sales office at 3460 Wilshire Blvd., Los Angeles 5, Calif.

The Scrap Rubber & Plastics Institute of the National Association of Waste Material Dealers, Inc., New York, N. Y., has appointed a new executive committee which will include Jerome H. Desser, Desser Tire & Rubber Co.; Ben Gordon, A. Schulman, Inc.; Milton Kushkin, A. Schulman, Inc.; Irving Levin, Superior Iron & Metal Co.; A. Lowenstein, A. Lowenstein Co., and Henry Rose, H. Muehlstein, Inc.

Witco Chemical Co. has moved its Los Angeles, Calif., offices to 3460 Wilshire Blvd.

United States Rubber Co., tire division, New York, N. Y., has consolidated its advertising department and sales promotion activities under the direction of advertising manager C. H. Shirley.

Rhodia, Inc., New York, N. Y., has appointed Naugatuck Chemical Division of Dominion Rubber Co., Ltd., its Canadian sales and technical representative for its industrial deodorants and aromatics.

E. I. du Pont de Nemours & Co.'s employe magazine, *Better Living*, for May-June, 1955, has published the findings of a specially appointed nine-member panel of experts who were asked to select the most important chemical developments of the last 35 years. The four top-ranking developments were listed as synthetic fibers, antibiotics, plastics, and synthetic rubber.

The Firestone Tire & Rubber Co., Akron, O., has completed construction of its new 300- by 600-foot warehouse in Cleveland, O., the firm's largest storage facility for home and auto supplies; the Cleveland district office will now be housed there.

Linear, Inc., Philadelphia, Pa., is producing O-rings from a newly developed synthetic compound, WJ-70, that resists swelling or shrinking from such organic fluids as diester lubricants, high-temperature hydraulic fluids, petroleum-base fuels and lubricating oils, organic phosphates, and many halogenated fluids and solvents.

The Goodyear Tire & Rubber Co., Akron, O., has produced its 650,000,000th pneumatic tire, a world's record for a single firm, the company says. The last 25,000,000 tires were manufactured in nine months; whereas it took 17 years to turn out the first 25,000,000.

Schenectady Resins, division of Schenectady Varnish Co., Schenectady, N. Y., has expanded and modernized its facilities for terpene resin production, giving the firm a complete line of resins from pourable oils at 10° C. melt point to hard resins at 125° C. The added equipment and plant space will also mean new standards of color and product uniformity, the company says. The resins are being used as tackifiers in adhesives, for aluminum paint vehicles, and as rubber processing aids.

United States Rubber Co., New York, N. Y., has received an Award of Honor from the National Safety Council for its meritorious record of 2.5 lost-time accidents per million man-hours worked during 1954 in its 36 domestic plants. On an individual plant level, the company reports that its footwear plant at Naugatuck, Conn., has set a new safety record in the rubber industry, with 7,801,624 man-hours worked without a lost-time accident.

American Maintenance Supply Co., Chicago, Ill., has developed a process for forming beads from wax blends and special formulae for use in rubber compounding. Called Detero Wax Beads, the material is said to be advantageous by facilitating handling, providing uniform dispersal in compounding, and remaining separate and free-flowing in storage. Waxes are generally added to rubber formulations in proportions of 2-8% PHR; about 1% of the wax remains in solution, and the rest forms a surface bloom that serves as an anti-oxidizing film.

Taylor Instrument Cos., Rochester, N. Y., has moved its San Francisco offices and plant to larger and better equipped quarters at 1661 Timothy Drive, San Leandro, Calif.

The Eagle-Picher Co., Cincinnati, O., has purchased Wilson & Hoppe Plastics, Whittier, Calif., manufacturer of laminated plastic products sold under the trade name Lamin-art.

The Firestone Tire & Rubber Co., Akron, O., is building a new warehouse at Pottstown, Pa., which will have 300,000 square feet of storage space and a storage capacity of 500,000 tires.

United States Rubber Co., New York, N. Y., is planning to double the size of its foam rubber plant at Santa Ana, Calif., to permit the manufacture of foam rubber mattresses on the West Coast and in order to expand production of foam cushioning for furniture.

Obituaries

Harold G. Robinson

Harold G. Robinson, vice president and director of Whittaker, Clark & Daniels, Inc., New York, N. Y., died May 3. He was 57.

Mr. Robinson joined the firm of W. B. Daniels in 1916 and two years later became sales representative for the new company created by the merger of W. B. Daniels and W. H. Whittaker Co. In 1940, he was named executive vice president.

Mr. Robinson served in Naval Aviation during World War I.

He held memberships in Gramercy Lodge 537 F. & A. M., the Wool Club, and Rockville Centre Country Club.

He is survived by his wife and a son.

Harold G. Robinson

T. M. Hughes

T. M. Hughes, manager of dealer operations for Seiberling Rubber Co., Akron, O., died May 16 in an Akron hospital after a ten-month illness.

He was born in Monroe, Tenn., 60 years ago. He attended Oklahoma University and served in the field artillery during World War I.

He started his business career with the Goodyear Tire & Rubber Co., but joined Seiberling on February 1, 1922, three months after the firm was founded. He rose through various positions during his career, including assistant traffic manager, manager of commercial sales, manager of accessories and repair materials sales, assistant to the general sales manager, and manager of dealer operations. He was also first editor of the company's employe newspaper, *The Seibeneer*, and founded its first dealer publication, *The Seiberling News*.

Mr. Hughes was a member of the American Legion and Akron Masonic Lodge 83 and was a charter member of the Seiberling 25-Year Club.

Surviving him is his wife.

Robert T. Brown

Robert T. Brown, since 1945 development administrator for The Goodyear Tire & Rubber Co., Akron, O., died April 29 after an illness of several weeks.

He first joined Goodyear in 1917, but left to serve as a lieutenant in the U. S. Army Field Artillery during World War I. Upon his demobilization, he reentered Georgia Institute of Technology, graduated in 1918, and rejoined Goodyear as

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a tire design engineer. He became manager of technical service for the firm's new Toronto, Ont., Canada, plant and was advanced to development manager in 1925. Between 1927 and 1934 the deceased served as development manager of technical service for Goodyear at Wolverhampton, England, and thereupon returned to Akron as assistant manager of tire design. During World War II he served as manager of military products for the company.

Mr. Brown held memberships in the American Society of Automotive Engineers and the Pythagoras Masonic Lodge. He was also on the Army Ordnance Rubber Advisory Committee during World War II.

He was born in Bremen, Ga., December 27, 1896.

Surviving him are his wife, three daughters, five grandchildren, two brothers, and three sisters.

Funeral services were held at Westminster Presbyterian Church, Akron, April 30.

Norman J. Elder

Norman J. Elder

Norman J. Elder, vice president and manager, calender division, Adamson United Co., Akron, O., and a member of the Editorial Advisory Board of *Plastics Technology*, died April 18 at a Dayton, O., hospital. His death was the result of an accident in a gymnastic exhibition at the YMCA in that city.

He was born August 15, 1917, at Carnegie, Pa. After attending public schools in Akron, O., Mr. Elder was graduated, in 1941, from the University of Akron, receiving a bachelor's degree in mechanical engineering.

He joined Adamson in 1946 after having served as assistant chief draftsman for Morse Instrument Co. from 1942-1944, and as a naval engineering officer from 1944-1946. He was made a vice president of Adamson in April, 1954.

Mr. Elder was a member of American Society of Mechanical Engineers, the University Club of Akron, and the Ohio Society of Professional Engineers.

He is survived by his wife, three children, his mother, and a brother.

Financial

Allied Chemical & Dye Corp., New York, N. Y. First quarter, 1955: net income, \$11,708,486, equal to \$1.29 each on 9,110,020 capital shares, compared with \$10,206,286, or \$1.15 each on 8,858,376 shares, a year earlier; sales, \$149,467,812, against \$133,095,236.

Anaconda Wire & Cable Co., New York, N. Y. March quarter, 1955: net profit, \$1,259,541, equal to \$1.49 each on 843,962 capital shares, against \$1,256,853, again equal to \$1.49 a share, in last year's period.

Goodyear Tire & Rubber Co., Akron, O., and subsidiaries. First quarter, 1955: net earnings, \$12,028,872, equal to \$1.32 a common share, against \$12,470,584, or \$1.29 a share, in the 1954 quarter; net sales, \$333,286,839, against \$273,322,247.

American Zinc, Lead & Smelting Co., Columbus, O. Quarter to March 31, 1955: net earnings, \$508,745, equal to 63¢ a common share, compared with \$252,110, or 25¢ a share, in last year's period.

Philip Carey Mfg. Co., Cincinnati, O. Initial quarter, 1955: net income, \$308,704, equal to 34¢ a share, against \$235,255, or 27¢ a share, a year earlier.

Collins & Aikman Corp., New York, N. Y. Year ended February 28, 1955: net loss, \$267,347, against net loss of \$1,208,933 in the preceding fiscal year.

Cooper Tire & Rubber Co., Findlay, O. March quarter, 1955: net profit, \$57,088, equal to 35¢ a share, against \$70,592, or 45¢ a share, a year earlier.

Columbian Carbon Co., New York, N. Y., and subsidiaries. Quarter ended March 31, 1955: net earnings, \$1,661,266, equal to \$1.03 each on 1,612,218 capital shares, compared with \$1,289,583, or 80¢ a share, in the like period last year; sales, \$15,409,371, against \$13,856,529.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and consolidated subsidiaries. Initial quarter, 1955: net income, \$93,736,360, equal to \$2.00 each on 45,471,321 common shares, compared with \$73,793,248, or \$1.56 each on 45,449,016 shares, in the like period last year; net sales, \$478,879,548, against \$408,911,536.

Mt. Vernon-Woodberry Mills, New York, N. Y. March quarter, 1955: net income, \$267,000, equal to 41¢ a share, compared with \$94,000, or 15¢ a share, a year earlier.

National Rubber Machinery Co., Akron, O. First quarter, 1955: net earnings, \$141,143, equal to 75¢ each on 195,556 capital shares, compared with \$204,812, or \$1.05 a share, a year earlier; net sales, \$2,837,675, against \$3,116,658.

New Jersey Zinc Co., New York, N. Y., and subsidiaries. First quarter, 1955: net profit, \$1,207,813, equal to 62¢ each on 1,960,000 capital shares, contrasted with \$592,346, or 30¢ a share, in the 1954 quarter.

Phillips Petroleum Co., Bartlesville, Okla., and subsidiaries. March quarter, 1955: net profit, \$22,110,258, equal to \$1.50 each on 14,710,169 shares, compared with \$19,162,400, or \$1.31 each on 14,625,754 shares, in the like period last year.

Pittsburgh Coke & Chemical Co., Pittsburgh, Pa. Initial quarter, 1955: net earnings, \$577,000, equal to 51¢ a common share, contrasted with \$32,000, or 36¢ a preferred share, in the like period last year.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., and consolidated subsidiaries. Quarter to March 31, 1955: net earnings, \$16,026,948, equal to \$1.73 a share, contrasted with \$7,179,978, or 79¢ a share, in the same quarter of 1954; sales, \$139,733,132, against \$98,126,720.

St. Joseph Lead Co., New York, N. Y., and subsidiaries. March quarter, 1955: net profit, \$3,369,616, equal to \$1.24 each on 2,716,222 capital shares, contrasted with \$1,099,377, or 40¢ a share, a year earlier; net sales, \$31,723,474, against \$17,841,481.

Westinghouse Air Brake Co., Wilmerding, Pa., and subsidiaries. January 1-March 31, 1955: net earnings, \$1,509,000, equal to 36¢ each on 4,126,216 capital shares, compared with \$922,000, or 22¢ each on 4,124,366 shares, in the 1954 period; net sales, \$37,550,000, against \$31,021,000.

News From Abroad

Malaya

Government Replanting Scheme

After months of study of the Mudie Report and discussion with the Rubber Producers' Council, the Malayan Government finally announced its own replanting and taxation scheme in a White Paper, issued April 26.

The Government has carefully avoided anything compulsory in its proposals and has been wary also of unduly high export duties at prices over 80 cents (Straits) per pound, the two most controversial points in the Mudie recommendations.

Briefly, the Malayan Government proposes to save the rubber industry by spending \$280,000,000, spread over 11 years, to aid estates in replanting about 400,000 acres and to give additional assistance to smallholders. The sum of \$168,000,000 is to be allotted to estates of 100 acres and over, to whom will be paid \$400 per acre—half the estimated cost—to replant 21% of their acreage in the next seven years at the rate of 3% a year. The type of assistance to smallholders out of the remaining \$112,000,000 is yet to be decided on.

At the same time there will be changes in taxation; the present Schedule II cess for replanting will be abolished, which is in agreement with the Mudie recommendations. On the other hand, the government has rejected the Mudie proposal to drop the export duty when the price of rubber is 60 cents per pound or under, on the grounds that it would thereby uselessly lose revenue of \$40,000,000 a year, which could not be recovered by other methods of taxation. However, the existing rates at and below 80 cents per pound, will be reduced. The new taxes will be higher than present rates when the price is over 80 cents, but will not be so steeply graduated as under the Mudie plan. Furthermore an anti-inflationary cess will be included in the export duty when the price of rubber is above \$1.00, amounting to 2.5 cents at a price of \$1.10 and 12.5 cents at \$1.50, the proceeds being returnable to the industry when a lower price level—still to be determined—is reached.

The present scale of duties (including export duty and Schedule II cess for replanting), the new duties (including anti-inflationary cess at high price levels), and the Mudie rates are in the table (next column) in Straits cents per pound:

The government, moreover, has made it clear that it does not favor new planting by smallholders except in special cases where replanting is not possible or advisable.

Rubber Price	Present Duty	Proposed Duty	Mudie Rates
40	2	1.6	—
50	2.5	2	—
60	3	2.3	—
65	4	3.3	1
70	5	4.2	2.5
75	6	5.2	4.5
80	7	6.1	7
90	9	9.2	12
100	11	12.3	17
110	13	16	22
150	21	35	42

Only taxation and replanting were considered in the White Paper; the Mudie measures on unemployment, recession, maintaining capital in the industry and attracting fresh capital, marketing and processing of smallholder rubber, are to be discussed separately.

Praise and Blame

The White Paper has come in for some praise and a full measure of criticism, chiefly from directors of larger estates who feel that the scheme penalizes the efficient to aid the inefficient. The Rubber Producers' Council has rather reluctantly accepted the government scheme as a "practical means of preserving and improving the competitive position of the natural rubber industry," but it is not at all happy about the export duty which it considers justifiable only by the financial difficulties of the Emergency, and it reserves the right to reopen the question of taxation at a later, more opportune, time.

The *London Times*, though it considers the scheme unsound by strict economy standards, as it will reduce the chance of production being concentrated in the more progressive estates, yet finds it has two "broad virtues": it will increase replanting, and should do much to avert the social and political problems whch would arise if many estates had to close down.

The *Financial Times* of London recognizes the difficulties of the present conflict of interests, those of the efficient producers and those of the Malayan industry as a whole.

The *Straits Times* considers the scheme workable and a great improvemtnt on the Mudie original. To the argument that the scheme would in effect put a premium on inefficiency, it replies that it would be better and more reasonable to say that the "inefficient—if that is the word—should be helped to become efficient."

A strong case can be made out in favor of spending millions to save the rubber industry, the *Malay Mail* admits. Nevertheless it considers the prospect ahead terrifying, even for a country whose finances are sound, let alone one well in the red and likely to remain so for years to come. It is a disturbing reflection, it adds, that a nation's main economy should have to be given this stimulus.

The Malayan Trade Union Council vigorously attacked the plan, calling it a "sell-out," and a "swindle." The "crazy" scheme offers excellent propaganda for subversive elements, it warned, noting that there is "no money for hospitals, schools, housing, slum clearance, or social services," but millions for rubber investors.

On the other hand, Tuan Sheikh Ahmad, representing smallholders on the Federal Legislative Council, and Saw Sung Kew, president of the Chinese Chamber of Commerce, Penang, approved the plan.

Plan Unanimously Accepted

Latest press releases announce that despite attacks by trade union members, the government's replanting and taxation scheme was finally accepted unanimously by the Federal Legislative Council. The British Government, it seems, has indicated that it will stand by the Federation Government, if, in spite of maximum local effort, financial assistance should become necessary for the scheme.

Outputs and Exports Higher

Under the stimulus of better prices, rubber production increased during the first quarter of 1955 to 159,979 tons, the highest Malayan figure since the first quarter of 1951, when the record amount of 163,648 tons was produced.

Shipments of latex from Malaya have been increasing rapidly and represent a growing proportion of total rubber exports. In 1953 latex exports came to 72,143 tons, or 9% of total rubber exports in that year; in 1954 the figure was 92,369 tons, or about 10% of total exports; during the first quarter of 1955, shipments at 28,972 tons represented 11.68% of the total; they were 41% above the 20,526 tons shipped out in the first quarter of 1954.

Britain was Malaya's best customer for latex in 1954, taking 30,158 tons; the United States bought 28,175 tons; West Germany 8,581 tons; and France 4,720 tons. In the first quarter of 1955, the United States led with 11,788 tons, followed by Britain with 9,351 tons and West Germany with 1,690 tons. Of the 1,499 tons purchased by France in that quarter, the record amount of 1,065 tons was taken in March alone.

Mann Submits Resignation

The director of the Rubber Research Institute of Malaya, C. E. T. Mann, has sent in his resignation over the decision of the board of the Institute to restrict research expenditure. Research programs proposed by the Institute have been cut and put off for another year.

Ever since a five-year program of research, for which \$42,000,000 had been provided, ended in 1953, the financing of further research and the extent of such research have been undecided, leading to much discontent among researchers at the Institute, a few of whom have already resigned. The work at the Institute is fi-

(Continued on page 402)

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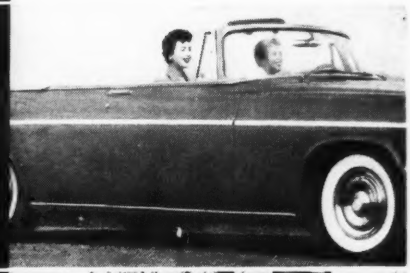

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NEW EQUIPMENT

Daigger's Model 500 Oven

Small Electric Oven

A small, 13-cubic-foot electrically heated oven with a temperature control accuracy of ±2° F. has been placed on the market by A. Daigger & Co., Chicago, Ill. Designated Model 500, the oven is part of the company's series of automatic temperature control cabinets called Robotemp, which includes ovens, incubators, and conditioning and drying cabinets.

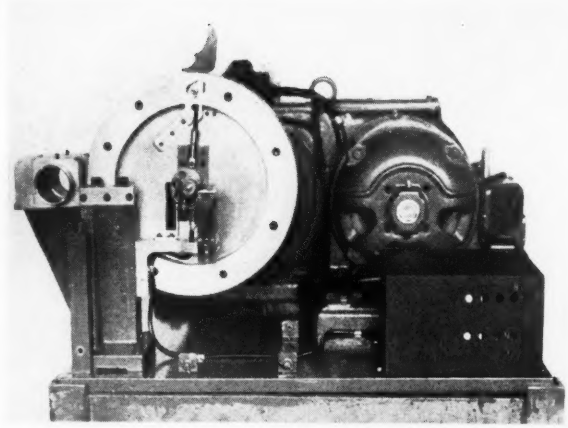
Maximum adjustable temperature of the Model 500 is 350° F. Features include glass wool-insulated double steel walls, thermostat with sealed hydraulic element, silicone door gasket, exhaust shutter, and perforated steel shelves. The oven operates on 110-125 volts A.C. 50-60 cycles.

Extrusion Cutter

A new electronically controlled extrusion cutter that can handle plastic and rubber tubes and shapes up to 2¼ inches in diameter with a speed as high as 7,080 pieces a minute has been introduced by Foster-Allen Corp., Garwood, N. J. Called Foster-Allen precision cutter, the machine provides a wide range of stepless increments, including speeds of as low as one cut every 6½ minutes, with a cutting tolerance of ±0.005-inch.

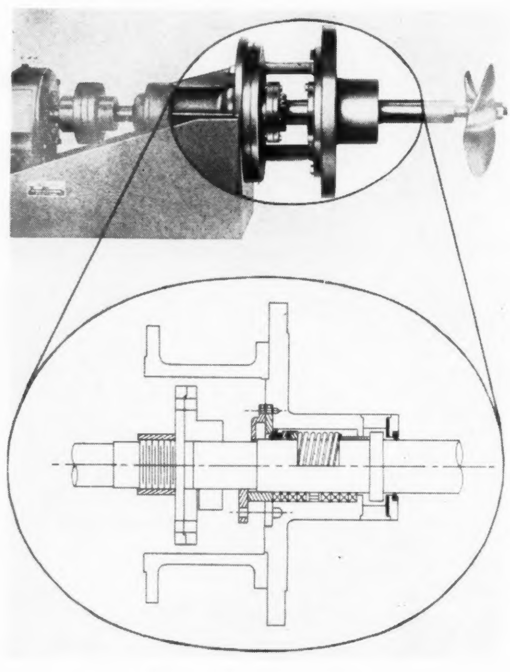
For speeds of less than 150 cuts per minute, a retractable knife, pivoted near the rim of the flywheel and swinging in an arc, is used. The knife is balanced around the pivot and operating on ball bearings, and this design considerably reduces friction and centrifugal force, permits more rugged knife construction, and reduces the number of stops for lubrication and maintenance, the company reports.

For higher speeds, fixed knives are attached to the flywheel. Regardless of cutting interval, the blade never travels less than 100 inches a second, thus obtaining square cuts, and avoiding backing-up of the material against the knife. Besides rubber and plastics, the machine handles soft wires, reinforced hose,



Foster-Allen precision cutter

impregnated fabrics, synthetic and natural fibers, and asbestos and can cut multiple extrusions if these are fed to the knives by means of bushings.



Nettco Side Drive Seal

Mechanical Shaft Seal

A side-drive mechanical shaft seal which can be repaired, replaced, or converted to a conventional stuffing box while under a full head of pressure has been placed on the market by New England Tank & Tower Co., Everett, Mass. Called Nettco Side Drive Seal, it incorporates a secondary seal that temporarily seals off the tank while the mechanical shaft seal is being serviced. The annular area occupied by the mechanical seal is said to permit quick substitution of a conventional stuffing box for the mechanical seal in the event that seal replacement parts are temporarily not available.

In addition to eliminating costly tank drainage for seal repair, the device is said to afford positive protection against loss of product in case of seal failure. With highly volatile fluids, this is also a safety factor. The seal-off gasket cannot become clogged or impaired by gritty material from the storage tank, the company reports, insuring positive seating of the seal-off collar against the seal-off gasket during repair.

NEW MATERIALS

Modified Butyl Rubber — Hycar 2202

A Butyl rubber which has been modified by the addition of bromine in the polymer chain and is said to possess properties unobtainable with conventional Butyl has been introduced commercially by B. F. Goodrich Chemical Co., Cleveland, O. Called Hycar 2202, the rubber is reported to exhibit increased cure rates, requiring only 1/4-3/4 the quantity of accelerator needed to obtain comparable states of cure with conventional Butyl; Hycar 2202 is compatible with other rubbers such as natural and GR-S and can be bonded to other rubbers and to metals.

Typical Butyl properties, such as excellent ozone resistance, heat and light aging resistance, good electrical insulating characteristics, and exceptionally low air permeability, are inherent in Hycar 2202. Light amber in color and available in slab form, the rubber was patented by Goodrich early in 1953 and first introduced as Hycar HH.

At room temperature, the Cooey adhesion (pounds pull/inch of width) of Hycar 2202 to a blend of GR-S and natural rubber is 60-70; while that of conventional Butyl is 5-10. At 212° F., the Cooey adhesion of Hycar 2202 to the blend is 20-30; Butyl does not adhere at all at this temperature. Accordingly, cements based on Hycar 2202 form strong bonds between natural and Butyl rubbers and metals primed with phenol- or resorcinol-formaldehyde resins, Goodrich declares.

A comparison of the physical properties of Hycar 2202 with Butyl (GR-I-17) after a 40-minute cure at 280° F. follows:

	Hycar 2202	Butyl
Ultimate tensile strength, psi	2290	2960
Modulus at 300% elongation, psi	1040	510
400% elongation, psi	1530	800
Ultimate elongation, %	580	770
Hardness (Duro A)	77	61

Service Bulletin H-18, describing Hycar 2202 and reporting test data, is available from the company.

Acrylate Elastomer for Hydraulic Packings

A new acrylate elastomer expected to find practical application in the field of hydraulic packings because of its high resistance to a variety of organic fluids has been developed by Monsanto Chemical Co., St. Louis, Mo. Trade marked Vyram, the material is currently undergoing additional research and, although not yet available commercially, may be obtained in moderate quantities for private evaluation.

Other advantages claimed for it include unusual resistance to ozone, easy fabrication with conventional rubber processing equipment, and its believed adaptability to such diverse uses as hose lining, wire coating, and as an impregnant for specialty fabrics. A marked deficiency of the elastomer, however, is its tendency to stiffen at extremes of temperature.

Supplied in a masterbatch consisting of the polymer, carbon black, silica, and oleic acid, Vyram, when cured at 330° F. for 30-60 minutes, shows the following physical properties:

Shore A hardness	75
Ultimate tensile strength, psi	1333
Elongation, %	346
Compression set, 70 hrs. @ 100° C. (Method B, 25% deflection),	
% of thickness	20.0
Deflection	75.0
Tear strength, lb./in.	178

Available from Monsanto is a technical data sheet containing all the known information on the elastomer.

Extreme-Temperature Silicone Rubber — Silastic 250

An extreme-temperature silicone rubber stock that remains serviceable at temperatures ranging from −100 to +500° F. has been introduced by Dow Corning Corp., Midland, Mich. Called Silastic 250, the rubber is said to be applicable to a wide variety of military and industrial applications, including gaskets, seals, and diaphragms, shock mounts, cable connections, and covers for rollers and heat-sealing irons.

The material may be molded, extruded, calendered, or sponged. Sponging especially is more easily done than with any other Silastic stock, the company says.

Typical properties of Silastic 250 after curing at 480° F. for various periods have been reported as follows:

	4 Hrs.	16 Hrs.	24 Hrs.
Hardness, Shore A	38	43	45
Tensile strength, psi	650	675	675
Elongation, %	340	300	290
Tear strength, Die B, pounds per inch	80	75	70

A bulletin describing the material and its applications, Silastic Facts, Reference 9-357, may be obtained on request.

Low Compression Set Silastic 7-163

A medium durometer, low compression set silicone rubber stock, Silastic 7-163, also is being marketed by Dow Corning. Serviceable at temperatures down to −70° F. and said to exhibit excellent physical properties at temperatures as high as 500° F., the rubber can be molded into resilient parts, gaskets, and seals for high-temperature applications. It cannot, however, be used for items that come in contact with food, drugs, or cosmetics, since it contains a mercury compound as a low compression set additive.

Typical physical properties, after certain cure periods, follow:

	4 Hrs.	16 Hrs.	24 Hrs.
Hardness, Shore A scale	45	50	55
Tensile strength, psi	475	475	475
Elongation, %	150	120	100
Compression set, %	45	20	15

A bulletin describing Silastic 7-163, Silastic Facts, Reference 9-358, also is available from the company.

Bisonides—Neoprene, Nitrile Rubber Extenders

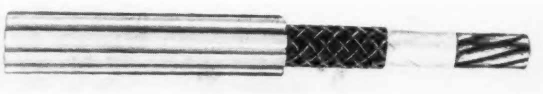
The Bisonides are a series of new polymeric materials produced by a new process from vulcanized rubber scrap as a basic raw material by U. S. Rubber Reclaiming Co., Buffalo, N. Y. Although the starting hydrocarbon may be natural or GR-S scrap rubber, the Bisonides are polar and exhibit properties normally associated with other polar synthetic rubbers. These Bisonides vary from a soft elastomer to a hard, tough thermoplastic material and are relatively low in cost.

The Bisonides are oil resistant and possess excellent aging properties. The most suitable polymers for blending with Bisonides are neoprene and nitrile rubbers. These extenders can be blended with natural or GR-S rubbers, but such blends do not respond to normal compounding techniques since metal oxides are the recommended curing agents, and sulfur and accelerators are not necessary. MBT is a retarder and may be used to prevent scorching.

The Bisonides have almost unlimited possibilities for modifying the properties of neoprene in connection with use in oil- and solvent-resistant compounds for gaskets, mechanical goods, soles and heels, oil-extended stocks, structural hard rubber, and CV wire. The Bisonides can be extended with large quantities of petroleum and/or ester oils; the oil can be added by the user, or he can obtain Bisonides that have already been oil extended and need no further mill breakdown. Some typical properties

(Continued on page 414)

NEW PRODUCTS



U. S. Royal Gold Welding Cable

Fluted Welding Cable

A light and flexible fluted welding cable said to have long wearing and high impact resistance qualities has been placed on the market by United States Rubber Co., New York, N. Y. Called U. S. Royal Gold Welding Cable, it is constructed of a yellow jacket made of 60% natural rubber compound, rayon reinforcing braid, natural rubber compound insulation, and conductors wrapped in high-grade insulating paper tape.

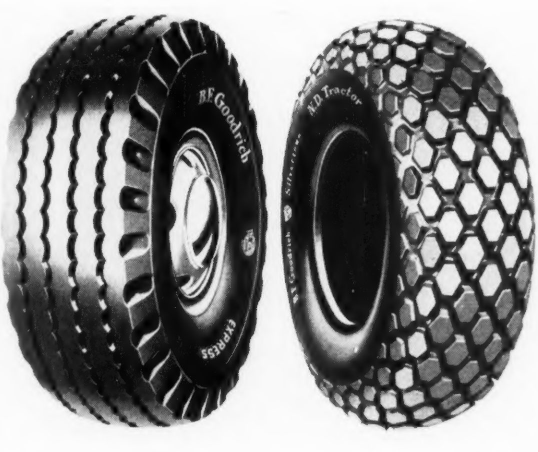
Purpose of the fluting, according to the company, is to provide better grip as well as to increase the rate of heat dissipation. The jacket is yellow for improved visibility, decreasing accidental injuries to both cable and workmen; it will, in addition, provide a second color for identification purposes when a black cable is also used on a welding machine.

Goodrich Low-Cost Truck Tire and Non-Directional Tractor Tire

A low-cost highway truck tire intended particularly for city delivery truck operators and small fleet operators has been introduced by the B. F. Goodrich Co. Tire & Equipment Division, Akron, O. Called the Express, the new tire has a conventional five-rib design and is available in 18 sizes and ply ratings, ranging from 7.00-15 6-ply to 10.00-22 12-ply.

According to the company, this tire is expected to be popular with large, over-the-road haulers who need a low-priced tire for trailer wheels that offers good traction and skid resistance.

A new non-directional tractor tire for operating in loose soils where good traction and high flotation are needed has also been placed on the market by the Tire & Equipment Division. This tire is available in 11-28, 9-16, and 12-26 4-ply sizes, and in 13-26, 14-26, and 15-26 6-ply sizes. It also performs competently on hard surfaces, the company says.

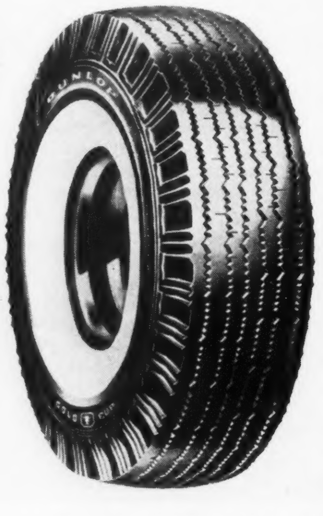


Goodrich's Express (left) and N. D. Tractor Tires

Goodyear 1.75 Bicycle Tire

A new premium bicycle tire designed to fit all balloon tire rims has been placed on the market by The Goodyear Tire & Rubber Co., Akron, O. Dubbed New Super Eagle 1.75, the tire has a streamlined cross-section that is halfway between the regular balloon tire's 2.125 cross-section and the lightweight 1.375 cross-section, providing good cushioning, minimum rolling resistance, and easy operation, the company asserts. Both black and white sidewalls are available in sizes 24 x 1.75 and 26 x 1.75, with the well-known Goodyear diamond tread pattern.

Cool-Running Dunlop Tubeless



Gold Cup "Tension-Free" Tubeless

A tubeless tire claimed to be the coolest running tire yet produced has been put on the market by Dunlop Tire & Rubber Corp., Buffalo, N.Y. Called Gold Cup "Tension-Free" tubeless, the tire is said to have long life; increased safety; an air-tight and self-sealing inner liner which is integral with the tire body and cannot creep to cause imbalance and road thump; and tire fabric made of Super Cordura cord.

Explaining the "tension-free" characteristic of its product, Dunlop says that the mold shape for the tire permits it to assume naturally the section similar to that into which all tires are forced under load. By anticipating distortion in designing the mold, engineers eliminated constant reverse flexing at the shoulder and the development of severe stresses and destructive heat. The tire is said to run more than 10 degrees cooler than conventional tires.

Tires and Tubes for Morris Minor

Dunlop has also introduced tires and tubes in the 5.00-14 size to fit the English-made Morris Minor automobile. Manufactured in the firm's top-grade Gold Cup quality, the tires are available in black sidewalls only and will fit Minors made in 1949 or later.

The cost of the Dunlop tire is lower than that of the imported variety.

Kleinert's Air Cushioned Rubber Scuffs

Quilted Rubber Scuffs

Washable scuffs for beach and locker room wear designed with rubber soles and quilted rubber have been introduced by I. B. Kleinert Rubber Co., New York, N. Y. Called Air Cushioned Rubber Scuffs, they are for both men and women and are made only in white in small, medium, and large sizes.

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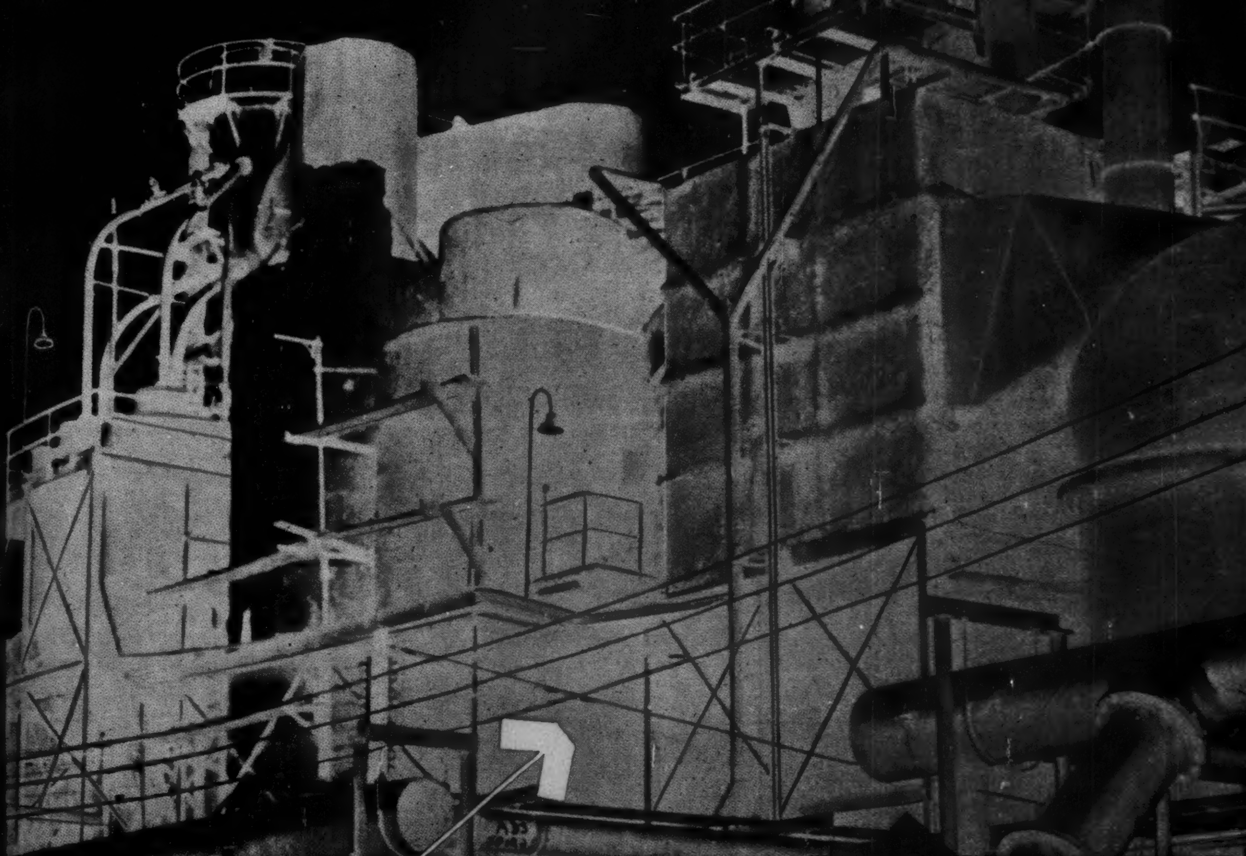
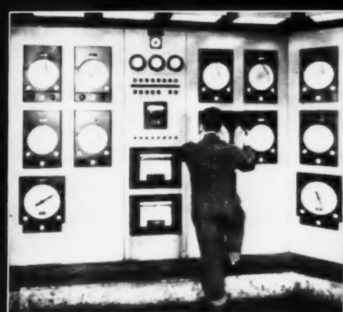
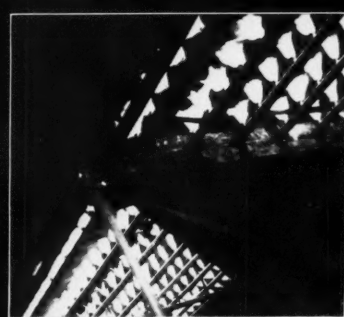


what it takes to make
WITCO-CONTINENTAL
CARBON BLACKS



This instrument panel helps control properties of Witco-Continental furnace blacks.



Inside a channel house at one of Witco-Continental's channel black plants.

. takes complex reactors, automatic controls and efficient collecting acilities . . . and (for channel blacks) thousands of flame tips npinged against a moving channel.

n five modern plants, Witco-Continental manufactures a comprehensive line of carbon blacks for every rubber compounding need.

Vitco-Continental has what it takes *(facilities and experience)* to nake carbon blacks of highest quality — and to give you expert technical service on your formulations.

For a listing of Witco-Continental Carbon Blacks

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TECHNICAL BOOKS

BOOK REVIEWS

"Nomography and Empirical Equations." Dale S. Davis. Reinhold Publishing Corp., New York, N. Y. Cloth, 6 by 9½ inches, 242 pages. Price, $6.75.

A valuable addition to the ready reference sources of the working engineer, this book discusses the many engineering applications of empirical equations and nomography and points the way to the use of these principles as durable and practical tools in the solving of perennial calculations. Within the frame of the development of empirical equations for two- and three-variable data, new techniques utilizing trigonometric and hyperbolic functions are explained, as well as the modified Gompertz equation, devices for two-variable data, and simple methods for correlating three-variable data. Also covered are the theory and construction of several industrially important types of alinement and line coordinate charts for the rapid correlating of data.

"Conversion Factors and Tables." Second Edition. O. T. Zimmerman and Irvin Lavine. Industrial Research Service, Inc., Dover, N. H. Cloth, 4½ by 6¼ inches, 522 pages. Price, $5.00; abroad, $5.50.

Intended as both a time saver and an eye saver for the technical worker, and successful on both counts, this convenient and easy-to-read book contains conversion factors on probably all of the known physical constants in use in the United States and throughout the world, as well as arithmetic, engineering, and scientific conversion tables. Export-import firms, too, and manufacturers with foreign commitments, will find the foreign conversion factors of great convenience, for one never knows when one may be called on to convert an Afghanistan kharwar or a Finnish skalpunt to pounds.

"Solubilization and Related Phenomena." M. E. L. McBain and Eric Hutchinson. Academic Press Inc., New York, N. Y. Hard cover, 6 by 9 inches, 259 pages. Price, $7.00.

Twenty-five years ago, few would have dignified the phenomenon of solubilization with the name of science. Little was known of the physical mechanism of, for example, soap dissolving in water, except that it happened. Today, much more is known, but most of that acquired knowledge has been pieced together bit by bit through the empirical method, and theory is still sparse. Vast areas of the contemporary economy, such as soaps and detergents, food, textile dyes, vitamins, and antibiotics, are offsprings of solubilization, but illegitimate in the sense that much of their true origins is still unknown to us.

Here is a book that attempts to assemble all theoretical and empirical knowledge of the subject. Covered are such topics as historical background, properties of colloidal electrolytes, solubilization as a sorption phenomenon, data and facts of solubilization, mechanism of solubilization, physiological aspects, practical applications, theory of light scattering, and behavior of polysoaps. This is an important book for the researcher in the field.

NEW PUBLICATIONS

"Swivel Joints for Piping." Catalog No. 265-B (revised). Barco Mfg. Co., Barrington, Ill. 12 pages. Specifications, dimensions, and applications of the company's movable joints for chemical, heating, process, power, and hydraulic piping are contained in this booklet.

"The Intermix." Francis Shaw & Co., Ltd., Manchester, England. 20 pages. Photographs and applications of the currently available Intermix machines for compounding rubbers, plastics, and other materials are contained in this brochure.

"Glycols." F-4763. Carbide & Carbon Chemicals Co., division of Union Carbide & Carbon Corp., New York, N. Y. 60 pages. A reference book for technical, research, and sales personnel, this publication contains chemical and physical properties, test data and methods, constant-boiling mixture information, specifications, and suggested applications for the 12 commercial glycols and triols sold by the company, and others available in developmental quantities.

"Nodular Iron for Rolls and Castings." Aetna-Standard Engineering Co., Pittsburgh, Pa. 12 pages. The chemical composition and mechanical properties of the firm's various types of modular iron, as well as roll and casting applications, are included here. This booklet is extensively illustrated with photographs of foundry operations and end-products.

"Rubber Grade Carbon Blacks." Revised May, 1955. Phillips Chemical Co., Rubber Chemicals Division, Akron, O. 1 page. A table of all the rubber grades of carbon black available on the general market is provided on this sheet.

"Silastic Facts." Reference 9-215. Dow Corning Corp., Midland, Mich. 1 page. The ventilation required in curing low compression set Silastic stocks because of cadmium or mercury additives is discussed.

"Marketing and Economic Research . . . Your Problem?" Foster D. Snell, Inc., New York, N. Y. 8 pages. The firm's chemical market research system and some of its past achievements in the field are outlined here.

"Man-Made Rubber and the Men Who Made It." William S. Richardson. The B. F. Goodrich Co., Akron, O. 28 pages. The 25-year commercial history of American synthetic rubber, from its small beginnings through government ownership during the war to its current role as a booming industry under the free-enterprise system, is discussed in this booklet by Goodrich's president.

"Kralac A-EP—a High-Styrene Resin." Compounding Research Report No. 34. I. E. Cutting. Naugatuck Chemical, Division of United States Rubber Co., Naugatuck, Conn. 16 pages. Recipes for compounding Kralac A-EP, a high-styrene and butadiene copolymer, with natural and synthetic rubbers, and the resulting physical properties are detailed in this booklet. The resin is essentially a medium for increasing the hardness and abrasive resistance of such rubber goods as shoe soles and heels, floor tile, stair treads, and matting.

"GR-S & GR-I Synthetic Rubbers." Sales Catalogue Revisions and Additions. 5 pages. Federal Facilities Corp., Washington, D. C. Included here are revisions for the Index Section and new general information on a GR-S unit package for the shipment of GR-S non-pigmented polymers in plastic film.

"Roll Surface Finishes." Industrial Rolls Report No. 6. Rodney Hunt Machine Co., Orange, Mass. 2 pages. The four types of roll surface finishes are described: not machined, lathe finished, polished or ground, and superfinished.

"Interpretation of Engineering Data: Some Observations." Harold F. Dodge. The American Society for Testing Materials, Philadelphia, Pa. 36 pages. Price, $1.50. An Edgar Marburg Lecture first presented at the ASTM's 1954 annual meeting, this paper analyzes the functions of the statistical method in the interpretation of engineering data. The author's many accomplishments in the field class him as a pioneer with Shewhart in the development of statistical quality control methods.

"Proceedings of the Joint Army-Navy-Air Force Conference on Elastomer Research and Development, January 12 and 13, 1954." National Academy of Sciences—National Research Council, Washington, D. C. Publication 370. 147 pages. The three branches of the Armed Services have participated at approximately two-year intervals in joint conferences on elastomer research and development since 1950.

The first session of the two-day conference in January, 1954, reported in this publication, was concerned with the progress and status of elastomer research and development in the three branches of the Armed Services, the Office of Synthetic Rubber, Reconstruction Finance Corp., and the rubber industry. The second session was devoted to research on elastomer deterioration. More than 250 rubber technologists and military officials took part in these conferences.

Two of the papers on the first session on progress and status of elastomer research, that is, "The Future Military Elastomer Research Program," by J. H. Faull, Jr., consultant to the Office of Naval Research, and "The Industry-Sponsored Rubber Research Program," by H. J. Osterhof, Goodyear Tire & Rubber Co., have appeared in past issues of RUBBER WORLD.

Noteworthy papers in the session on elastomer deterioration included the following: "Deterioration of Elastomers," by Robert F. Shaw, Rock Island Arsenal; "Methods for the Evaluation of Chemical Protectants as Inhibitors of Ozone-Induced Degradation of GR-S," by Alvin D. Delman and others, New York Naval Shipyard; "Radioisotope-Tracer Techniques for the Quantitative Measurement of Surface Cracking of Elastomers," J. L. Kalinsky and T. A. Werkenthin, U. S. Navy, Bureau of Ships; "The Synthesis of Oriented High Polymers," by W. J. Bailey, University of Maryland; and "Biosynthesis of Rubber," by James Bonner, California Institute of Technology, and others.

Even though almost 18 months have elapsed since these papers were presented, the current publication will be of interest to many rubber scientists and technologists.

"Beverage and Sanitation Hose." The B. F. Goodrich Co., Industrial Products Division, Akron, O. 2 pages. Specifications and descriptions of these hose are included in this catalog.

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Oxidation of Unvulcanized Rubber. Effect of Carbon Black. F. Lyon, K. A. Burgess, C. W. Sweitzer, *Ind. Eng. Chem.*, Mar., 1954, p. 596.

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(*Continued on page 414*)

MARKET REVIEWS

Natural Rubber

Quiet conditions prevailed on both spot and futures markets during the period from April 16 to May 15 despite the still-record levels of rubber consumption. The few offerings made on the foreign cables were mostly rejected as too high in cost, with strikes in Singapore and Indonesia providing no stimulation to demand. Consumers here seemed content with the size of their stockpiles and sure of their future supplies. Eastern rubber in the months ahead was deemed plentiful, theatened neither by drought nor the possibility of warfare.

In the United States, the GSA rotation operations were putting more and more rubber into the immediate market, making some manufacturers, mostly small, indifferent to conditions abroad. Faith in the future of the synthetic industry, both in terms of production capacity and expanded usage through research developments, continued to grow. Finally, the second International Rubber Quality and Packing Conference, held in New York, N. Y., the first week in May, was occupying the creative time of big consumers and traders, contributing in no small measure to the dullness of the market.

Prices kept pace with activity during the period, as seen by a high-low differential of 1¾¢ a pound on the spot market for R.S.S. #1 and only 21,660 long tons traded in futures.

Barring unforeseen political developments, the market should swing up only slightly during the coming month, with mild positive and negative factors cancelling each other out, and the overall situation remaining about what it is now.

Statistically, on the New York Commodity Exchange, sales for the second half of April were 12,850 tons, bringing the monthly total to 23,860 tons. Sales during the first half of May were 8,810 tons. Near-May stocks began the period at 32.65¢ a pound and dropped to 31.35¢ on May 10, when they expired.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

Futures	Mar. 26	Apr. 23	Apr. 30	May 7	May 14
May	31.55	32.10	31.40	31.00	....
July	31.16	31.95	31.36	31.27	31.70
Sept.	30.75	31.45	30.90	30.90	31.45
Dec.	30.45	31.05	30.60	30.50	31.05
1956					
Mar.	30.10	30.60	30.15	30.15	30.75
May	29.75	30.30	29.80	29.90	30.45
July	....	....	....	....	30.15
Total weekly sales, tons	10,120	7,070	5,780	2,900	5,910

On the physical market, R.S.S. #1 began the period at a high of 32.75¢ on April 18, dropped to a low of 31.00¢ by May 4, and ended the period at 32.00¢.

April monthly average spot prices for certain grades follow: R.S.S. #1, 32.13¢; R.S.S. #3, 31.79¢; #3 Amber Blankets, 29.09¢; and Flat Bark, 26.87¢.

NEW YORK SPOT MARKET
WEEK-END CLOSING PRICES

	Mar. 26	Apr. 23	Apr. 30	May 7	May 14
R.S.S.: #1	32.00	32.63	31.88	31.75	32.00
2	31.88	32.50	31.63	31.38	31.63
3	31.75	32.38	31.25	31.00	31.25
Latex Crepe					
#1 Thick	34.38	35.50	34.00	33.75	34.13
Thin	34.13	35.25	34.13	33.88	34.25
#3 Amber Blankets	29.13	29.63	28.50	28.63	29.13
Thin Brown Crepe	28.88	29.13	28.13	28.38	28.88
Flat Bark	26.75	27.63	25.88	25.88	26.25

Synthetic Rubber

(Editor's Note: News of the new synthetic rubber industry has been covered elsewhere on the pages of this issue. We feel it is still premature to make personal commentary on the market situation and related data, but we will reserve this column for such information in the future.)

Below are the prices of synthetic rubber grades so far received, in carload lots, f.o.b., plant.

Enjay Butyl 035, 150, 215, 217, 218, 325	*lb.*	$0.23 /	$0.26
Plioflex 1000, 1006, 1502	*lb.*	.2425/	.255
1703	*lb.*	.2075/	.22
1710	*lb.*	.19 /	.2025
Pliolite Latex 2101	*lb.*	.2775	
2104, 2105	*lb.*	.28	
X765	*lb.*	.265	

Latex

Consumption of *Hevea* and synthetic latices continued high during the period from April 16 to May 15, depleting stocks to such an extent that some quarters estimated less than a month's supply remains. Many orders for June and July deliveries were still unfulfilled, and some already-purchased May quantities were yet to be delivered. August and September deliveries remained uncertain, and only October, November, and December orders were without unreasonable pressure, although consumption is again expected to veer upward during this period.

The price of *Hevea* latex during April was in the 39¾-44¢ range; deliveries after June were somewhat easier, at 38¾-41¢. Synthetic latex prices are quoted at from 21.5¢ to 28¢, exclusive of freight charge.

Final February and preliminary March domestic statistics for natural and synthetic rubber latices follow:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
February	0	6,110	7,066	8,619
March	0	....	8,231	7,701
GR-S				
February	5,483	151	4,881	5,753
March	6,991	87	5,617	6,862
Neoprene				
February	797	0	689	879
March	854	0	889	867
Nitrile				
February	641	0	501	663
March	672	0	457	578

Scrap Rubber

Trading was sluggish to fair during the period from April 16 to May 15, with most activity limited to the filling of orders of mixed auto tires for May shipment to Naugatuck, and some business in Butyl tires reported in the East. Warm weather is expected to stimulate collections of scrap during the rest of May and June.

Latest Department of Commerce statistics show imports of scrap rubber during January to have totaled 2,088,703 pounds, valued at $117,514. December imports amounted to 2,225,107 pounds, worth $106,498. January, 1954, imports were 2,228,612 pounds, value, $76,380.

Prices at the end of the period showed considerable rise and fall over last month's quotations, but no trend was apparent. Current dealers' buying prices for scrap rubber grades, in carload lots delivered to mills at the points indicated, follow:

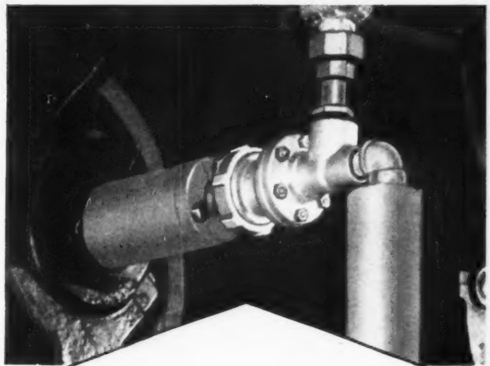
	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$12.00	$13.00
S. A. G. auto tires	Nom.	13.00
Truck tires	Nom.	14.00
Peelings, No. 1	40.00/41.00	40.00/42.00
2	24.00	Nom.
3	15.50	Nom.
Tire buffing	17.00	14.00/15.00
	(¢ per Lb.)	
Auto tubes, mixed	4.00	4.00
Black	5.00	5.00
Red	6.75	6.75
Butyl	5.25	5.75

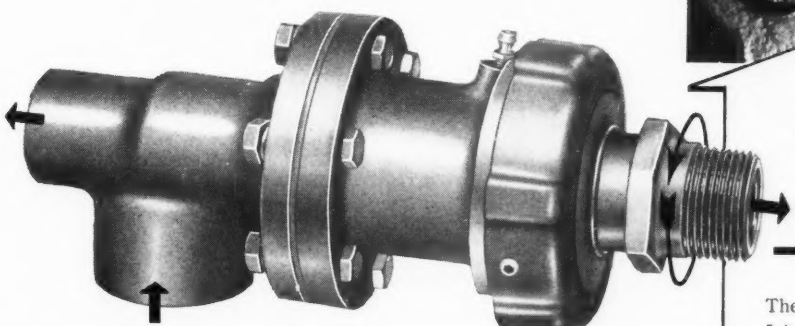
Reclaimed Rubber

The reclaimed rubber market continued to expand during the period from April 16 to May 15, with all indications pointing to record levels, even in excess of the war years. Consumers were evidently continuing their high rate of stockpiling because of uncertainty regarding the American labor scene in the months ahead. Automotive production also was continuing at peak levels. Observers will not venture to predict when the boom will end, but optimism is still the keynote.

No change was reported in the reclaim price structure.

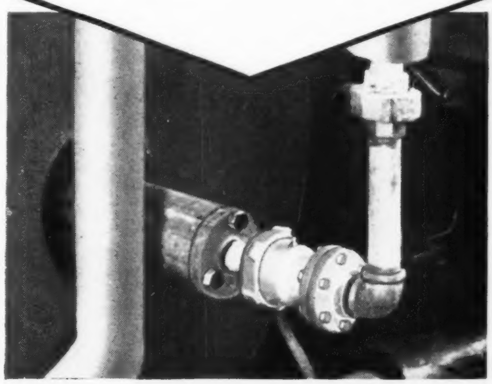
BARCO REVOLVING JOINTS





ON JOB 4 YEARS —NO REPAIRS!

These 1" Barco Type IBR Revolving Joints shown in the accompanying photographs (syphon style, above; single flow style, below) handle 45 psi steam at 20 to 30 RPM and run up to 8 hours per day. Their record of four years' service without repairs under normal conditions of temperature, pressure, and speed shows that BARCO IS YOUR BEST INSURANCE FOR LONG, TROUBLE-FREE SERVICE when you need *rotary steam joints* on rolls, dryers, drums, calendars, and mixers.



Performance that Pays Dividends

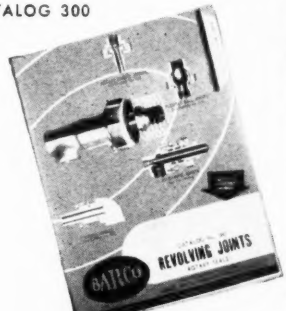
IN RUBBER PLANTS

HOW MUCH is it costing you to use less efficient types of rotary joints? . . . For Repair Parts? . . . For "Down Time"? . . . For Extra Power Costs? CHECK YOUR RECORDS—then look at these Barco advantages:

- Trouble-free Performance! Thanks to long lasting "CTR" V-Type Seal Rings—a Barco Development.
- Low Maintenance; No Adjusting. Easy to inspect or service, with no special tools required.
- Low Torque—Cuts Power Costs up to 50% – particularly, at higher pressures.
- Unexcelled Ability to withstand Vibration and Hard Usage.
- Better Temperature Control where steam is used for heating rolls due to better circulation. Barco Joints hold seal standing or running.

You can prove it on your own equipment! Make this test now with new, improved Barco Revolving Joints. Send for complete information and a copy of Catalog No. 300.

• CATALOG 300



SEND FOR INFORMATION

BARCO MANUFACTURING CO.
510G Hough St., Barrington, Illinois

Gentlemen:
Please send me information about Barco Revolving Joints checked at right.

Name____________________

Company____________________

Address____________________

- ☐ Single flow styles. Series 150. Sizes ½" to 2".
- ☐ Syphon Styles. Series 150. Sizes ½" to 2".
- ☐ Revolving syphon styles. Sizes 1" to 2".
- ☐ Series 250 for higher pressures. Sizes 2½" and 3".
- ☐ Heavy duty joints. Sizes up to 5".
- ☐ High speed Type NV joints. Size ¼".

RECLAIMED RUBBER PRICES

	Lb.
Whole tire: first line	$0.10
Fourth line	.0875
Inner tube: black	.15
Red	.21
Butyl	.15
Pure gum, light colored	.23
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Rayon

Total calculated production of rayon and acetate yarn during April was 73,600,000 pounds, of which 39,000,000 pounds were regular-tenacity yarn and 34,600,000 pounds high-tenacity yarn, a slight decrease from March's figures. Shipments of yarn also were off, totaling 78,700,000 pounds, of which 43,000,000 were regular-tenacity yarn, and 35,700,000 pounds high-tenacity yarn. Month-end stocks, also below the previous figure, follow: total yarn, 39,300,000 pounds; regular-tenacity yarn, 33,800,000 pounds; and high-tenacity yarn, 5,500,000 pounds.

For the first quarter of this year, production of rayon and acetate yarn plus staple plus tow was 308,200,000 pounds, 4% higher than the fourth quarter, 1954, figure.

Prices per pound of rayon tire yarns and fabrics were unchanged.

RAYON PRICES

Tire Yarns

High Tenacity		
1100/ 480	$0.62	
1100/ 490	.62	
1150/ 490	.62	
1165/ 480	.63	
1230/ 490	.62	
1650/ 720	.61	
1650/ 980	.61	
1875/ 980	.61	
2200/ 960	.60	
2200/ 980	.60	
2200/1466	.67	
4400/2934	.63	
Super-High-Tenacity		
1650/ 720	.64	
1900/ 720	.64	
Tire Fabrics		
1100/490/2	.72	
1650/980/2	.695 /	.73
2200/980/2	.685	

Cotton Fabrics

Trading on the industrial fabric market was heavy during the period from April 16 to May 15 as rubber companies, coaters, and other users of industrial cloth attempted to cover their needs well into June on such fabrics as wide drills, broken twills, chafers, hose and belting, and other types of cotton ducks. As a result, many of these goods appeared in tight supply, although observers predicted no severe shortages. Some mills producing wide drills, broken twills, and other goods found their order commitments quickly catching up with their productive capacity for the first quarter of the year. The situation is not at all unfamiliar to the market for the season.

The possibility of strikes and the inevitability of slackened production due to vacation slowdowns or shutdowns have spurred consumers to try to fatten their stockpiles before the summer months.

Prices held steady during the period.

COTTON FABRICS

Drills			
59-inch 1.85 yd.	*yd.*	$0.37 /	$0.375
2.25-yd.		.32 /	.325
Ducks			
38-inch 1.78-yd. S.F.	*yd.*	nom.	
2.00-yd. D.F.		nom.	
51.5-inch, 1.35-yd. S.F.		nom.	
Hose and belting		.67	
Raincoat Fabrics			
Printcloth, 38½-inch, 64x60, 5.35-yd.	*yd.*	.14 /	.1475
6.25 yd.		.12	
Sheeting, 48-inch, 4.17-yd.		.20	
52-inch, 3.85-yd.		.22	
Osnaburgs			
40-inch 2.11-yd.	*yd.*	.245	
3.65-yd		.155	
Chafer Fabrics			
14.40-oz/sq. yd. Pl.	*yd.*	.70	
11.65-oz./sq. yd. S.		.61	
10.80-oz./sq. yd. S		.6575	
8.9-oz./sq. yd. S.		.67	
Other Fabrics			
Headlining, 59-inch, 1.65-yd., 2-ply	*yd.*	.465	
64-inch, 1.24-yd., 2-ply		.595	
Sateens, 53-inch, 1.32-yd.		.54	
58-inch, 1.21-yd.		.59	

Malaya

(*Continued from page 384*)

nanced by a cess of 0.5-cent a pound on rubber exported. For the past two years certain sections of the industry have advocated an increase in the cess; the Mudie Mission suggested a cess of 0.75-cent; others, 0.85-cent. The Rubber Growers' Association has so far favored the existing rate. It is expected that the board will give the matter serious consideration before long; meanwhile it has refused to accept Mr. Mann's offer of resignation.

Ceylon

The Replanting Program

The Rubber Rehabilitation Board will spend about 23,000,000 Rs. on the 1955 replanting program, an amount which will include the normal allocation of 13,000,000 Rs. in addition to 10,000,000 Rs. out of the Rubber Price Stabilization Fund. The government replanting scheme, begun two years ago, originally provided for replanting 13,000 acres a year for five years; permits for 1955, however, will cover twice the yearly acreage, that is, 26,000 acres. Apparently 28,000 acres were already replanted in 1953 and 1954 so that the total for three years will amount to 54,000 acres, if the program for the current year is fully carried out.

Sheet Rubber Freed for Export

Early in January, Ceylon freed sheet rubber for export to countries other than China. The rubber-rice pact calls for 50,000 tons of sheet rubber to China annually, and it is expected that a surplus of about 20,000 tons will be available for free exports. Later in the month the Ceylonese Government also decided to permit non-Ceylonese to export up to 4,000 tons a year to markets other than China.

1954 Rubber Output

Ceylon produced 93,935 tons of rubber in 1954, it is officially reported. Of the total, 90,209 tons were exported, including 57,149 tons sheet rubber, 2,556 tons sole crepe, 17,929 tons scrap crepe, 9,446 tons latex crepe, and 3,129 tons latex. Communist China took 56,185 tons of sheet in addition to a very small amount of crepe.

•

Correction

In the abstract of an article on results of tread tests in Germany, appearing on page 96 of our April, 1955, issue, the last paragraph of the first column reads:

"For these tests, three types of compounds were prepared: A, containing carbon black only; B, containing carbon black and silicic acid filler; and C, with silicic acid filler only."

This should have been:

"For these tests, three types of compounds were prepared: A, containing carbon black only; B, containing silicic acid filler only; and C, containing carbon black and silicic acid filler."

Consequently the first paragraph under the table in the second column, which reads:

"Both A and B showed better abrasion resistance than C; in laboratory tests results for B were close to the level for A. In fatigue tests, too, C was inferior to both A and B. Tensile strength was about the same for all three types, but B and C had lower modulus, higher elasticity and lower damping values."

should read:

"Both A and C showed better abrasion resistance than B; in laboratory tests results for C were close to the level for A. In fatigue tests, too, B was inferior to both A and C. Tensile strength was about the same for all three types, but B had lower modulus, higher elasticity, and lower damping values."

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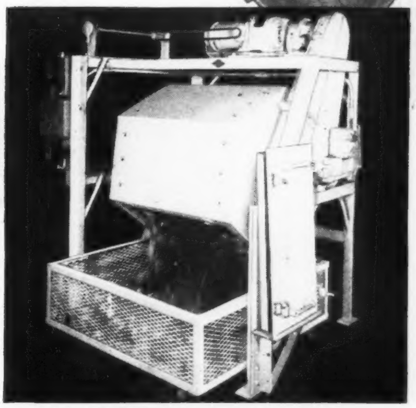

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STATISTICS of the RUBBER INDUSTRY

U. S. A. Imports and Production of Natural (Including Latex and Guayule) and Synthetic Rubber

Long Tons

Year	Natural	GR-S	S-Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1943	55,329	181,470	789	1,373	33,603	14,487	287,052
1944	107,834	668,831	11,118	20,252	56,660	16,812	881,507
1945	135,672	717,693	7,163	52,378	45,672	7,871	966,449
1946	400,687	612,687	721	80,823	47,766	5,738	1,148,422
1947	688,354	405,496	3,362	62,824	31,495	6,618	1,198,149
1948	735,227	390,240	15,252	56,662	34,848	7,012	1,239,241
1949	660,792	288,882	21,717	54,046	35,215	11,072	1,071,724
1950	802,249	350,801	28,086	60,915	50,067	12,037	1,304,155
1951	733,048	694,583	9,946	76,475	58,907	15,333	1,588,292
1952	805,997	636,969	17,885	81,630	65,745	16,228	1,624,454
1953	647,615	668,386	12,342	79,801	80,495	20,198	1,508,837
1954							
Jan.	47,170	43,524	853	5,539	6,513	1,620	105,219
Feb.	42,645	40,661	1,030	4,801	6,206	1,574	96,917
Mar.	47,721	43,372	1,092	5,214	5,190	1,900	104,489
Apr.	49,855	34,384	1,167	6,004	5,601	1,645	98,656
May	55,983	35,117	1,120	4,581	4,828	1,960	103,589
June	66,698	35,829	1,263	3,182	5,101	1,696	113,769
July	40,614	35,415	1,388	4,960	4,673	1,814	88,864
Aug.	59,124	36,843	1,803	5,003	5,313	1,624	109,710
Sept.	48,618	38,937	2,183	4,675	6,036	1,718	102,167
Oct.	49,432	42,000	1,938	5,117	6,644	1,864	106,995
Nov.	45,474	41,109	2,021	5,060	6,839	1,913	102,416
Dec.	43,557	45,507	1,849	4,666	6,206	2,068	103,853
Total	596,848	472,698	17,707	58,802	69,150	21,396	1,236,601
1955							
Jan.	49,941	57,607	1,436	3,220	6,983	2,099	121,286
Feb.	50,880	55,293	1,149	3,727	6,910	1,729	119,688
Mar.*	....	63,940	1,293	5,256	7,132	2,158	....

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. Consumption of Natural (Including Latex) and Synthetic Rubber

(Long Tons)

Year	Natural	GR-S	S-Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1943	317,634	131,108	789	304	26,205	12,405	488,525
1944	144,113	494,115	1,437	10,763	46,243	14,112	710,783
1945	105,429	598,434	1,711	43,012	42,394	8,029	799,009
1946	277,597	631,405	721	79,228	44,357	5,988	1,039,296
1947	562,661	446,316	2,273	68,838	37,703	4,536	1,122,327
1948	627,332	334,233	11,080	58,870	32,118	5,771	1,069,404
1949	574,522	299,420	21,717	52,664	31,753	8,827	988,903
1950	720,268	388,427	27,803	66,348	43,781	11,930	1,258,557
1951	454,015	617,200	9,244	70,500	48,887	13,066	1,212,912
1952	453,846	648,816	17,604	71,229	55,522	13,866	1,260,883
1953	553,473	611,748	12,433	77,826	65,900	16,929	1,338,309
1954							
Jan.	46,960	37,707	982	5,438	4,774	1,272	97,133
Feb.	46,897	36,765	942	5,696	4,467	1,190	95,957
Mar.	53,709	42,074	1,062	6,300	5,177	1,447	109,769
Apr.	51,451	40,194	1,130	6,241	4,684	1,395	105,105
May	51,398	40,030	1,144	5,602	4,486	1,366	104,026
June	54,253	43,782	1,192	5,961	4,769	1,491	111,448
July	37,894	31,474	1,326	4,108	3,499	1,145	79,446
Aug.	38,069	30,800	1,596	3,569	4,647	1,439	80,120
Sept.	52,412	40,204	1,994	5,138	5,049	1,493	106,290
Oct.	55,970	45,002	2,061	4,711	4,931	1,604	114,279
Nov.	53,326	44,429	1,980	3,967	5,276	1,635	110,613
Dec.	55,096	50,540	1,935	4,583	5,434	1,638	119,226
Yr.-end adj.	− 1,150	....	....	+ 150	....	+ 600	....
Total	596,285	483,001	17,344	61,464	57,203	17,715	1,233,412
1955							
Jan.	56,911	54,728	1,643	4,478	5,676	1,854	125,290
Feb.	50,997	54,707	1,293	4,312	5,476	1,826	118,611
Mar.*	58,189	62,536	1,221	4,837	6,408	2,096	135,287

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

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U. S. A. Stocks of Latex

(Long Tons, Dry Weight)

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1944	2,443	....	....	....	....	2,443
1945	3,121	....	....	....	....	3,121
1946	4,865	....		....	....	4,865
1947	5,033	....		....	....	5,033
1948	11,235	....			....	11,235
1949	5,063	....		....	....	5,063
1950	4,927					4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954						
Jan.	12,375	5,001	1,019	703	6,723	19,098
Feb.	13,963	5,269	963	625	6,857	19,820
Mar.	11,870	5,247	975	588	6,810	18,680
Apr.	10,803	5,273	1,062	600	6,935	17,738
May	8,907	5,180	1,110	655	6,945	15,852
June	9,460	5,591	1,020	646	7,257	16,717
July	10,171	5,363	1,004	831	7,198	17,369
Aug.	12,009	4,220	1,019	993	6,232	18,241
Sept.	11,546	4,504	984	908	6,396	17,942
Oct.	10,952	4,745	1,001	950	6,696	17,648
Nov.	9,759	4,943	1,055	939	6,937	16,696
Dec.	11,133	5,134	1,087	811	7,032	18,165
1955						
Jan.	9,684	5,861	1,067	812	7,740	17,424
Feb.	8,619	5,753	879	663	7,295	15,914
Mar.*	7,701	6,862	867	578	8,307	16,008

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. Imports and Production of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1944	3,090	6,580	4,683	....	11,263	14,353
1945	4,768	15,176	7,077	....	22,253	27,021
1946	8,012	24,810	13,595	....	38,405	46,417
1947	17,675	22,474	6,089	....	28,563	46,238
1948	32,630	21,494	5,022	....	26,516	59,146
1949	29,974	21,357	3,651	....	25,008	54,982
1950	54,401	31,339	5,725		37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954						
Jan.	5,396	4,089	592	471	5,152	10,548
Feb.	5,681	3,928	742	375	5,045	10,726
Mar.	5,682	4,142	709	483	5,334	11,016
Apr.	5,663	4,046	803	461	5,310	10,973
May	3,806	3,839	680	623	5,142	8,940
June	6,590	4,019	620	585	5,224	11,814
July	5,181	2,589	448	643	3,680	8,861
Aug.	7,571	1,995	756	682	3,433	11,004
Sept.	6,480	4,190	676	581	5,447	11,927
Oct.	7,210	5,190	742	780	6,712	13,922
Nov.	6,335	5,115	717	558	6,390	12,725
Dec.	8,888	5,238	729	624	6,591	15,479
Total	74,483	48,379	8,214	6,866	63,459	137,942
1955						
Jan.	7,853	6,199	617	624	7,440	15,293
Feb.	6,110	5,634	797	641	7,072	13,182
Mar.*	....	7,078	854	672	8,604	

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. Stocks of Synthetic Rubber

(Long Tons)

Year	S-Types	Butyl	Neoprene	N-Type	Total
1944	122,412	9,992	12,262	5,366	150,032
1945	170,571	18,378	9,703	4,802	203,454
1946	83,090	19,478	10,470	3,755	116,793
1947	40,606	13,184	5,237	3,339	62,366
1948	96,304	10,995	5,072	2,762	115,133
1949	77,743	12,224	4,654	3,433	98,054
1950	36,942	7,243	5,733	2,840	52,758
1951	105,271	12,481	8,379	3,821	129,952
1952	83,861	22,716	8,535	3,875	118,987
1953					
Jan.	83,921	21,096	9,001	3,857	117,875
Feb.	81,550	19,560	9,078	3,911	114,099
Mar.	84,013	19,581	8,738	3,757	116,089
Apr.	89,839	19,144	9,364	3,694	122,041
May	100,873	18,376	8,986	3,874	132,109
June	112,770	18,141	9,073	3,805	143,789
July	127,278	18,280	10,036	3,892	159,486
Aug.	134,936	20,269	10,008	3,939	169,152
Sept.	132,453	21,280	9,671	4,221	167,625
Oct.	129,655	22,435	10,138	4,496	166,724
Nov.	127,464	23,401	11,067	4,591	166,523
Dec.	135,153	24,866	11,480	4,346	175,845
1954					
Jan.	138,692	24,733	13,065	4,349	180,839
Feb.	143,202	23,573	12,518	4,112	183,405
Mar.	145,178	22,329	12,575	4,202	184,284
Apr.	136,446	21,673	12,665	4,199	174,983
May	131,604	20,077	11,467	4,435	167,583
June	124,678	17,534	10,646	4,314	157,172
July	128,752	18,150	11,315	4,727	162,944
Aug.	135,164	19,672	10,710	4,613	170,159
Sept.	128,313	18,513	10,288	4,548	161,662
Oct.	127,204	18,653	11,038	4,272	161,167
Nov.	121,772	19,338	11,429	4,366	156,905
Dec.	115,499	19,267	11,349	4,280	150,395
1955					
Jan.	114,976	17,079	11,598	4,160	147,813
Feb.	111,796	15,424	10,555	3,885	141,660
Mar.*	114,048	15,148	11,055	3,660	143,911

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. New Supply, Consumption, Exports, and Stock of Reclaimed Rubber

(Long Tons)

Year	New Supply	Consumption	Exports	Stocks
1946	295,612	275,410	14,461	33,666
1947	291,395	288,395	14,556	35,943
1948	266,861	261,113	11,428	32,630
1949	224,029	222,679	10,367	28,263
1950	314,008	303,733	11,740	35,708
1951	366,700	346,121	14,722	45,082
1952	274,981	280,002	11,180	30,664
1953				
Jan.	27,258	25,356	866	31,244
Feb	24,583	24,098	950	30,631
Mar.	27,964	27,334	1,115	30,280
Apr.	29,032	26,483	1,261	31,263
May	27,142	25,213	964	31,763
June	26,554	24,637	962	32,791
July	23,292	23,414	807	31,506
Aug.	22,607	22,666	638	30,318
Sept.	23,469	22,409	894	30,147
Oct.	23,649	21,944	823	30,692
Nov.	21,323	19,638	1,086	31,226
Dec.	21,463	18,858	1,031	32,319
Yr.-end adj.	...	+3,000	...	...
Total	298,336	285,050	11,397	...
1954				
Jan.	20,026	19,114	912	31,865
Feb.	21,122	19,461	941	32,393
Mar.	23,383	22,882	830	32,148
Apr.	21,658	21,883	1,050	31,359
May	21,316	20,436	1,071	31,105
June	22,342	22,321	1,068	30,845
July	18,041	16,301	586	31,304
Aug.	15,519	17,660	647	27,692
Sept.	22,352	19,926	641	29,632
Oct.	23,566	22,098	808	30,395
Nov.	22,986	22,321	862	29,451
Dec.	25,790	24,546	816	30,746
Total	258,101	249,049	10,232	
1955				
Jan.	25,336	25,322	1,041	29,656
Feb.	25,444	24,333	1,085	30,125
Mar.*	29,653	28,685	1,063	30,069

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. Consumption of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1944	6,085	6,000	4,400	....	10,400	16,485
1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954						
Jan.	5,882	3,475	615	275	4,365	10,247
Feb.	5,595	3,568	575	250	4,393	9,988
Mar.	6,610	3,982	729	335	5,046	11,656
Apr.	5,892	3,748	603	324	4,675	10,567
May	5,969	3,394	586	348	4,328	10,297
June	5,884	3,653	629	402	4,684	10,568
July	4,298	2,587	482	296	3,365	7,663
Aug.	5,228	2,834	561	351	3,746	8,974
Sept.	6,903	3,599	628	379	4,606	11,509
Oct.	7,527	4,347	612	376	5,335	12,862
Nov.	7,622	4,411	631	411	5,453	13,075
Dec.	7,671	4,575	600	460	5,635	13,306
Yr.-end adj.	+350	....	....	+300	....	....
Total	75,931	44,173	7,251	4,507	55,931	131,862
1955						
Jan.	7,355	4,537	661	506	5,704	13,059
Feb.	7,066	4,881	689	501	6,071	13,137
Mar.*	8,231	5,617	889	457	6,963	15,194

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. Exports of Synthetic Rubber

(Long Tons)

Year	S-Types	Butyl	Neoprene	N-Type	Total
1944	98,380	530	4,799	557	104,266
1945	76,555	980	5,837	406	83,778
1946	68,763	495	2,642	797	72,697
1947	7,951	62	2,617	755	11,385
1948	1,093	21	2,875	885	4,874
1949	1,401	178	3,330	1,574	6,483
1950	900	31	4,826	1,895	7,652
1951	483	216	6,825	1,725	9,249
1952	9,467	126	9,813	2,695	22,101
1953					
Jan.	298	43	961	165	1,467
Feb.	458	114	566	124	1,262
Mar.	548	0	930	213	1,691
Apr.	414	47	818	210	1,489
May	943	3	1,127	201	2,274
June	769	2	741	257	1,769
July	765	4	905	236	1,910
Aug.	820	3	895	257	1,975
Sept.	702	0	1,065	456	2,223
Oct.	455	4	915	303	1,677
Nov.	729	11	1,155	409	2,304
Dec.	791	6	1,416	414	2,627
Total	7,692	237	11,494	3,245	22,668
1954					
Jan.	618	0	434	295	1,347
Feb.	508	2	1,251	287	2,048
Mar.	1,265	416	930	288	2,899
Apr.	520	62	1,296	454	2,332
May	1,115	373	844	395	2,727
June	881	216	694	215	2,006
July	1,126	421	1,220	358	3,125
Aug.	1,314	384	945	307	2,950
Sept.	785	53	978	270	2,086
Oct.	1,284	189	1,301	455	3,229
Nov.	659	575	1,081	435	2,750
Dec.	994	140	1,088	396	2,618
Total	11,069	2,831	12,062	4,155	30,117
1955					
Jan.	1,381	716	1,046	194	3,337
Feb.	1,331	370	1,049	259	3,009
Mar.*	1,356	543	1,048	226	3,173

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U. S. A. Rubber Industry Employment, Wages, Hours

Year	Production Workers (1000's)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Consumers Price Index
		All Rubber Products			
1939	121	$27.84	39.9	$0.75	....
1950	203	64.42	40.9	1.56	102.8
1951	219	68.70	40.6	1.69	111.0
1952	212	74.48	40.7	1.83	113.5
1953	221	77.78	40.3	1.93	114.4
1954					
Jan.	205.7	75.08	38.7	1.94	115.2
Feb.	202.9	75.47	38.9	1.94	115.0
Mar.	199.4	74.31	38.5	1.93	114.8
Apr.	195.2	75.08	38.7	1.94	114.6
May	197.0	77.81	39.7	1.96	115.0
June	198.4	79.60	40.2	1.98	115.1
July	173.1	76.83	39.4	1.95	115.2
Aug.	177.0	76.25	39.1	1.95	115.0
Sept.	198.9	77.81	39.3	1.98	114.7
Oct.	204.2	81.20	40.4	2.01	114.5
Nov.	204.6	83.02	41.1	2.02	114.6
Dec.	209.3	85.07	41.7	2.04	114.3
1955					
Jan.	210.5	84.25	41.3	2.04	114.3
Feb.	210.4	....	....	....	....
		Tires and Tubes			
1939	54.2	$33.36	35.0	$0.96	
1950	87.8	72.48	39.8	1.82	
1951	90.8	77.93	39.6	1.97	
1952	92.9	85.65	40.4	2.12	
1953	93.0	88.31	39.6	2.23	
1954					
Jan.	86.4	82.88	37.5	2.21	
Feb.	85.3	83.03	37.4	2.22	
Mar.	84.7	80.89	36.6	2.21	
Apr.	83.2	84.14	37.9	2.22	
May	83.9	88.65	39.4	2.25	
June	85.0	92.06	40.2	2.29	
July	67.3	87.01	38.5	2.26	
Aug.	68.0	85.65	37.4	2.29	
Sept.	85.2	86.18	38.3	2.25	
Oct.	86.5	90.39	39.3	2.30	
Nov.	83.7	94.54	40.4	2.34	
Dec.	87.0	98.18	41.6	2.36	
1955					
Jan.	87.6	97.41	41.1	2.37	
		Rubber Footwear			
1939	14.8	$22.80	37.5	$0.61	
1950	20.6	52.21	40.1	1.30	
1951	25.3	57.81	41.0	1.41	
1952	22.9	62.22	40.4	1.54	
1953	23.7	65.60	40.0	1.64	
1954					
Jan.	21.5	62.98	38.4	1.64	
Feb.	20.5	65.57	39.5	1.66	
Mar.	19.6	65.51	39.7	1.65	
Apr.	19.2	63.58	38.3	1.66	
May	19.8	65.46	39.2	1.67	
June	19.8	67.30	40.3	1.67	
July	20.1	68.45	40.5	1.69	
Aug.	20.5	66.40	40.0	1.66	
Sept.	21.0	66.08	39.1	1.69	
Oct.	21.9	71.34	41.0	1.74	
Nov.	22.3	71.51	41.1	1.74	
Dec.	22.3	71.69	41.2	1.74	
1955					
Jan.	22.1	68.97	40.1	1.72	
		Other Rubber Products			
1939	51.9	$23.34	38.9	$0.61	
1950	94.3	59.76	42.2	1.42	
1951	102.9	63.26	41.4	1.53	
1952	96.0	66.58	41.1	1.62	
1953	104.1	70.93	41.0	1.73	
1954					
Jan.	97.8	70.62	39.9	1.77	
Feb.	97.1	70.40	40.0	1.76	
Mar.	95.1	70.22	39.9	1.76	
Apr.	92.8	69.30	39.6	1.75	
May	93.3	70.98	40.1	1.77	
June	93.6	70.98	40.1	1.77	
July	85.7	70.62	39.9	1.77	
Aug.	88.5	71.15	40.2	1.77	
Sept.	92.7	72.36	40.2	1.80	
Oct.	95.8	74.98	41.2	1.82	
Nov.	98.6	75.71	41.6	1.82	
Dec.	100.0	76.44	42.0	1.82	
1955					
Jan.	100.8	76.08	41.8	1.82	

Source: BLS, United States Department of Labor.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATION WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words) Bold face type $1.60 per line (eight words) *Allow nine words for keyed address.*	Light face type 40c per line (ten words) Bold face type 55c per line (eight words)	Light face type $1.00 per line (ten words) Bold face type $1.40 per line (eight words) *Letter replies forwarded without charge, but no packages or samples.*

Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS WANTED

MOLDED AND MECHANICAL GOODS TECHNICAL MAN WITH 26 years' diversified experience in compounding, processing, control, industrial engineering, product development, supervision, and costs desires position in Sales, Technical or Production Supervision. Recent experience high-temperature, high-speed molding. Practical, energetic; possesses initiative, organizational ability; can handle personnel. Address Box No. 1736, care of RUBBER WORLD.

RUBBER TECHNICIAN, AGE 42, WITH 20 YEARS' EXPERIENCE in all phases of processing and manufacturing of molded and extruded mechanical rubber goods, seeks opportunity where this vast experience can be utilized. Excellent chemical and engineering background. Address Box No. 1737, care of RUBBER WORLD.

SITUATIONS OPEN

MECHANICAL RUBBER GOODS PLANT IN CALIFORNIA REquires young graduate chemist, with at least two years' actual compounding experience in this line. Excellent opportunity with successful established company. Replies confidential. Address Box No. 1727, care of RUBBER WORLD.

RUBBER AND PLASTICS

Rubber Chemist, sponge experience desirable, plant or laboratory. Rubber Chemist, general compounding and plant experience desirable. Plastics Chemists or Engineers, laboratory and plant experience desirable. Quality Control Supervisor, capable of installing new department. Expanding Operation. Opportunities for Advancement. Salaries open. Details on request. Write: Dale A. Dougherty, Assistant to the President, O'SULLIVAN RUBBER CORPORATION, Box 603, Winchester, Virginia.

CHEMIST
LATEX COMPOUNDS

Long-established and progressive manufacturer desires chemist with experience in compounding natural and synthetic latices. Position offers excellent opportunity in laboratory carrying out new product development and application work. Please give details of experience, education, and salary desired. Our employes have been informed of this advertisement. Address Box No. 1728, care of RUBBER WORLD.

RUBBER CHEMISTS

A fast growing and progressive organization in the Midwest has opportunities for experienced graduate chemists and chemical engineers in resin and rubber adhesive coatings. Assignments include product development of pressure-sensitive tapes in a modern and well-equipped laboratory and follow-through in pilot and production plants. Excellent working conditions, salary commensurate with experience. Send complete résumé with first letter. All replies held in strict confidence. Address Box No. 1729, care of RUBBER WORLD.

MECHANICAL GOODS MOLD DESIGNER

Mechanical Rubber Goods Div. of a Tire and Rubber Company in Ohio requires an experienced mechanical mold designer for a permanent position. Write giving full particulars regarding age, experience, education, and salary expected. Replies held confidential. Address Box No. 1730, care of RUBBER WORLD.

CHIEF LATEX CHEMIST TO DIRECT SOUTHERN MANUfacturing division of latex compounds for textile industry. Must be tops on compound experience and development. Excellent opportunity in established growing concern. State fully qualifications and requirements. Address Box No. 1731, care of RUBBER WORLD.

ASSISTANT
PLANT MANAGER

Nationally well-known New Jersey concern seeks a chemical or mechanical engineering graduate with 10 to 12 years' experience in the manufacturing of calendered and molded rubber and vinyl products. A fine opportunity for the right man. Résumé stating salary and qualifications to Box No. 1732, care of RUBBER WORLD.

A POSITION AS ASSISTANT SALES MANAGER IS OPEN with a leading midwest Rubber Manufacturer of custom molded rubber parts, O-rings, hydraulic seals, and Silicone. A successful record selling to the rubber industry, mechanical experience, a good earning record, some advertising experience, as well as a technical education are essential. Factory or laboratory experience would be helpful. Write details concerning experience, age, education, earning record, references, etc. All replies will be kept strictly confidential. Address Box No. 1733, care of RUBBER WORLD.

LATEX CHEMISTS, CHIEF AND ASSISTANTS, EXPERIENCED development, formulation, and production of can and jar sealing compounds, flow-in gaskets, also for technical sales service. All replies confidential. CAN-TITE RUBBER CORP., 1105 Metropolitan Avenue, Brooklyn 11, N. Y.

CHEMIST—ADHESIVES—DESIRE MAN WITH EXTENSIVE lab and field experience in compounding latex, thermoplastics, or synthetics. Salary open and excellent opportunity with fast-growing, medium-sized company. Write full details. FEDERAL LATEX CORP., 210 Wythe Ave., Brooklyn, N. Y

RUBBER TECHNOLOGIST-ASS'T PLANT MANAGER

Well-established Indiana company requires aggressive man experienced in mechanical, sponge, and extruded rubber manufacture. Must be of executive caliber able to assist in coordination and direction of working force. References required. Good salary and opportunity for right individual. Give complete résumé of experience in first letter. Replies will be confidential. Address Box No. 1734, care of RUBBER WORLD.

SITUATIONS OPEN (Continued)

One of our affiliated companies in Asia is interested in hiring a Chemist with knowledge of mill-room and rubber footwear manufacture. Excellent working conditions. Excellent pay. Send handwritten application and copies of references to Box No. 1725, c/o RUBBER WORLD. Employees of our company know about this ad.

LATEX CHEMIST

B.S. in chemistry or chemical engineering. Some experience in latex field preferred but not necessary. Good opportunity for laboratory work in expanding foam rubber plant of nationally known company. Eastern location. Write giving age, education, and experience. Replies kept in confidence. Our employes know of this advertisement. Address Box No. 1735, care of RUBBER WORLD.

TECHNICAL SERVICE

Position available for graduate engineer to handle technical service activities to tire industry. Applicants should be 30-35 years old with about 5 years experience in tire design and construction. Familiarity with both passenger and truck tires desirable. Location Central Eastern Seaboard.

Write full detail on age, education, experience. Replies will be kept strictly confidential.

ADDRESS BOX NO. 1726
c/o RUBBER WORLD

MACHINERY & SUPPLIES FOR SALE

FARREL 16" X 48" AND 15" X 36", 2-ROLL RUBBER MILLS, and sizes up to 84". New and used lab. 6" x 12" & 6" x 16" Mills and Calenders. American Tool 300-gallon Churns. Extruders 1" to 6". Baker-Perkins Jacketed Mixers 100, 50, and 9 gals. HPM 200-ton Hydr. Press 30" x 48" platens. Brunswick 200-ton 21" x 21" platens. 150-ton, 20" x 20" platens. Large stock Hydraulic Presses 12" x 12" to 48" x 48" platens. Hydraulic Pumps and Accumulators. Rotary Cutters. Stokes Molding Presses. Single-Punch & Rotary Preform Machines. Banbury Mixers, Crushers, Churns, Bale Cutters, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT CO., 107—8th St., Brooklyn 15, N. Y. STerling 8-1944.

CUTTING—RUBBER—SOLES
NEW WELLMAN MACHINE

UNVULCANIZED RUBBER OR PLASTIC
BEVEL OR STRAIGHT EDGE
CUT PRECISION SOLES UP TO 1" THICK

WELLMAN CO., MEDFORD, MASS., U. S. A.

U. S. A. Automotive Pneumatic Casings

(Thousands of Units)

	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
Passenger Car						
1945	1,115	25,463	222	26,800	28,200	2,214
1946	11,086	54,684	653	66,243	66,466	1,763
1947	19,644	52,857	1,608	74,109	77,795	5,444
1948	21,589	41,295	656	63,540	66,738	8,773
1949	28,129	36,440	509	65,077	65,140	8,904
1950	36,678	47,103	642	84,423	78,598	3,050
1951	26,729	34,226	723	61,678	65,546	6,973
1952	24,106	45,458	741	70,305	74,341	11,251
1953	33,106	45,798	809	79,713	81,455	13,044
1954						
Jan.	2,549	3,378	59	5,986	5,251	12,279
Feb.	2,323	3,001	60	5,384	5,952	12,832
Mar.	2,809	3,753	45	6,607	6,878	13,112
Apr.	2,785	4,328	95	7,208	7,031	12,955
May	2,695	4,503	101	7,300	6,985	12,575
June	2,587	5,326	89	8,002	7,755	12,323
July	2,516	5,222	73	7,812	5,605	10,063
Aug.	2,283	4,605	73	6,961	4,709	7,797
Sept.	1,375	3,825	73	5,273	6,242	8,950
Oct.	1,617	3,422	81	5,120	6,702	10,531
Nov.	2,823	2,844	91	5,758	6,480	11,331
Dec.	3,383	2,845	87	6,315	7,215	12,228
Total	29,746	47,043	928	77,717	76,806	
1955						
Jan.	3,481	4,139	79	7,699	7,797	12,363
Feb.	3,540	3,551	83	7,174	7,549	12,643
Mar.	4,326	4,255	104	8,685	8,810	12,874
Truck and Bus						
1945	4,869	11,016	282	16,167	16,324	863
1946	4,224	10,806	859	15,889	15,832	685
1947	5,412	10,014	1,648	17,074	17,755	1,505
1948	5,256	7,853	1,132	14,241	14,576	1,925
1949	3,456	7,026	958	11,440	11,228	1,734
1950	4,671	9,705	788	15,164	14,156	743
1951	5,424	10,386	954	16,764	17,859	1,791
1952	5,378	8,884	779	15,041	16,070	2,859
1953	4,843	9,326	734	14,904	14,696	2,676
1954						
Jan.	342	615	59	1,016	1,048	2,698
Feb.	311	556	57	924	1,089	2,877
Mar.	354	597	71	1,022	1,103	2,966
Apr.	346	607	81	1,035	1.034	2,951
May	324	612	83	1,020	980	2,928
June	303	703	71	1,076	1,041	2,895
July	265	725	82	1,073	755	2,577
Aug.	243	824	51	1,118	717	2,188
Sept.	227	711	57	995	1,037	2,233
Oct.	251	828	66	1,145	1,167	2,268
Nov.	301	716	67	1,084	1,145	2,345
Dec.	325	625	81	1,031	1,229	2,546
Total	3,592	8,111	826	12,529	12,347	
1955						
Jan.	303	827	81	1,211	1,243	2,586
Feb.	294	730	74	1,098	1,196	2,678
Mar.	454	672	96	1,222	1,273	2,734
Total Automotive						
1945	5,984	36,479	504	42,967	44,524	3,077
1946	15,310	65,490	1,512	82,312	82,298	2,448
1947	25,056	62,871	3,256	91,183	95,550	6,949
1948	26,845	49,148	1,787	77,781	81,314	10,698
1949	31,584	43,466	1,467	76,517	76,369	10,638
1950	41,349	56,808	1,430	99,587	92,754	3,794
1951	32,153	44,612	1,677	78,442	83,405	8,765
1952	29.484	54,342	1,520	85,346	90,411	14,110
1953	37,949	55,124	1,543	94,617	96,150	15,720
1954						
Jan.	2,891	3,993	118	7,002	6,299	14,977
Feb.	2,634	3,557	117	6,308	7,042	15,709
Mar.	3,163	4,350	116	7,629	7,981	16,077
Apr.	3,131	4,935	176	8,243	8,065	15,906
May	3,020	5,115	184	8,319	7,965	15,504
June	2,890	6,029	160	9,079	8,796	15,218
July	2,782	5,948	155	8,884	6,360	12,640
Aug.	2,527	5,429	123	8,079	5,427	9,985
Sept.	1,602	4,537	130	6,269	7,279	11,184
Oct.	1,868	4,251	147	6,266	7,869	12,799
Nov.	3,124	3,560	158	6,842	7,626	13,676
Dec.	3,707	3,470	169	7,346	8,444	14,774
Total	33,338	55,154	1,754	90,246	89,153	
1955						
Jan.	3,785	4,967	159	8,911	9.040	14,949
Feb.	3,833	4,281	157	8,272	8.745	15,321
Mar.	4,780	4,926	201	9,907	10.083	15.609

Source: The Rubber Manufacturers Association, Inc.

U. S. A. Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	——
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954						
Jan.	2,884	3,892	58	6,834	5,395	10,107
Feb.	2,636	2,908	74	5,617	5,896	10,448
Mar.	3,165	2,774	74	6,013	6,399	10,869
Apr.	3,134	2,770	97	6,001	6,266	11,234
May	3,017	2,900	84	6,002	5,909	11,170
June	2,889	3,657	85	6,631	5,739	10,379
July	2,707	3,471	87	6,265	4,132	8,429
Aug.	2,174	3,504	69	5,747	3.773	6,588
Sept.	1,130	2,839	64	4,033	4,489	7,179
Oct.	429	2,566	92	3,087	3,953	8,313
Nov.	449	2,142	90	2,681	3,245	8,706
Dec.	476	2,019	74	2,569	3,201	9,299
Total	25,090	35,442	948	61,480	58,397	
1955						
Jan.	413	3,629	74	4,116	3,089	8,252
Feb.	352	2,430	80	2,862	2,850	8,243
Mar.	491	2,732	105	3,328	3,234	8,217

Source: The Rubber Manufacturers Association, Inc.

Carbon Black Statistics—First Quarter, 1955

Furnace blacks are classified as follows:
SRF, semi-reinforcing furnace black
HMF, high modulus furnace black
FEF, fast extruding furnace black
HAF, high abrasion furnace black
SAF, semi-abrasion furnace black

(Thousands of Pounds)

	Jan.	Feb.	Mar.
Production			
Furnace types			
Thermal	9,315	8,269	10,317
SRF	25,099	26,162	26,258
HMF	9,060	7,610	8,538
FEF	12,395	11,597	14,943
HAF	33,199	29,344	34,011
SAF	15,627	18,010	18,139
Total furnace	104,695	100,992	112,206
Contact types	29,693	27,153	30,750
Totals	134,388	128,145	142,956
Shipments			
Furnace types			
Thermal	8,209	9,756	11,957
SRF	26,411	26,851	27,654
HMF	8,318	8,399	10,089
FEF	15,737	16,801	19,144
HAF	32,602	32,373	35,163
SAF	14,069	13,754	15,431
Total furnace	105,346	107,934	119,438
Contact types	43,403	35,263	42,107
Totals	148,749	143,197	161,545
Producers' Stocks, End of Period			
Furnace types			
Thermal	6,513	5,026	3,386
SRF	16,466	15,777	14,381
HMF	25,004	24,215	22,664
FEF	23,204	18,000	13,799
HAF	28,579	25,550	24,398
SAF	28,340	32,596	35,304
Total furnace	128,106	121,164	113,932
Contact types	172,647	164,537	153,180
Totals	300,753	285,701	267,112
Exports			
Furnace types	18,318	21,137	....
Contact types	15,973	15,583	....
Totals	34,291	36,720	....

Source: Bureau of Mines, United States Department of the Interior, Washington, D. C.

MACHINERY AND SUPPLIES FOR SALE—Continued

FOR SALE: 1—MOTORIZED LATEX DIPPING MACHINE WITH 24" x 36" Trays, 1—Circulating steel Latex Dipping Tank coated against corrosion, size 24" x 40", 2 New Stainless Steel Tanks, one used for coagulant and one used for leaching, size 24" x 42", 1—10' Floor-type Dipping Machine Track, 1—Pangborn Air Blast Cleaning Machine, 1—Electric Furnace. This machinery is new and can be shipped immediately as we need the space. LOX-ON MANUFACTURING COMPANY, P. O. BOX 2013, ATLANTA, GEORGIA.

FOR SALE: 1—ROYLE #4 EXTRUDER, MOTOR DRIVEN; 1—Ball & Jewell rotary cutter, size 0, m.d.; 1—6" x 12" laboratory mill, m.d.; 1—Ball & Jewell #2 rotary cutter, 15-HP motor; 3—#28 Devine vacuum shelf dryers, 19-59" x 78" shelves, complete; 1—Farrel-Birmingham 20" x 22" x 60" mill, top cap frame, Falk reduction drive, 100-HP motor; 2—Farrel-Birmingham 16" x 42" mills with reduction drive and 100-HP motor; 1—Read 2,000-lb. all steel double-ribbon horizontal mixer; 3—Colton #5½ single punch tablet machines, m.d.; also other sizes Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters. WANTED: Your Surplus Rubber Machinery. CONSOLIDATED PRODUCTS COMPANY, INC., 64 Bloomfield St., Hoboken, N. J.; HOboken 3-4425; N. Y. Phone: BArclay 7-0600.

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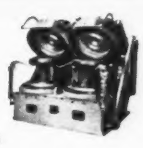


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World Production of Natural Rubber

(1,000 Long Tons)

	Malaya		Indonesia			
Year	Estate	Native	Estate	Native	All Other	Total
1947	360.5	285.8	12.8	265.2	335.7	1,260.0
1948	403.6	294.6	101.7	330.6	394.5	1,525.0
1949	400.8	270.7	169.1	263.9	385.5	1,490.0
1950	376.7	317.4	175.1	521.4	469.4	1,860.0
1951	328.8	276.5	222.5	591.9	465.3	1,885.0
1952	341.7	242.5	293.2	456.0	456.6	1,790.0
1953	341.8	232.6	301.8	390.4	458.4	1,725.0
1954						
Jan.	30.3	19.1	24.2	34.9	44.0	152.5
Feb.	25.4	18.0	23.0	30.2	30.9	127.5
Mar.	24.6	17.5	23.2	36.7	35.5	137.5
Apr.	24.8	15.4	21.2	37.0	34.1	132.5
May	27.6	18.6	22.9	32.9	30.5	132.5
June	27.0	16.3	21.0	33.5	39.7	137.5
July	31.0	23.0	26.8	46.2	38.0	165.0
Aug.	30.9	21.6	21.9	37.1	38.5	150.0
Sept.	30.1	23.4	23.6	46.4	41.5	165.0
Oct.	29.5	20.8	23.9	45.6	40.2	160.0
Nov.	31.9	22.9	24.3	36.8	46.6	162.5
Dec.	30.4	24.2	24.5	47.0	53.9	180.0
Total	343.5	240.8	280.5	464.3	473.4	1,802.5
1955						
Jan.	29.3	27.9	23.6	35.6	43.6	160.0
Feb.	28.5	20.3	22.3	39.9	36.3	147.5
Mar.	27.5	26.7	23.5	....	....	....

Source: BDSA, United States Department of Commerce; Secretariat of the International Rubber Study Group; and United Baltic Corp., Ltd.

World Consumption of Natural Rubber

(1,000 Long Tons)

Year	United States	U.S.S.R.* and China	United Kingdom	Other Foreign	Total Foreign	Grand* Total
1947	562.7	57.2	153.6	336.5	547.3	1,100.0
1948	627.3	121.0	193.7	480.5	795.2	1,422.5
1949	574.5	132.5	184.3	546.2	863.0	1,437.5
1950	720.3	152.5	219.7	612.5	984.7	1,705.0
1951	454.0	136.3	234.2	675.5	1,046.0	1,500.0
1952	453.8	146.8	197.3	652.1	996.2	1,450.0
1953						
Jan.	47.8	10.8	17.9	58.5	87.2	135.0
Feb.	45.2	18.2	15.4	56.2	89.8	135.0
Mar.	50.7	18.5	15.6	60.2	94.3	145.0
Apr.	49.4	11.0	18.4	58.7	88.1	137.5
May	46.9	11.3	16.3	58.0	85.6	132.5
June	48.2	5.0	15.7	63.6	84.3	132.5
July	43.9	3.1	16.8	63.7	83.6	127.5
Aug.	43.7	2.0	14.2	55.1	71.3	115.0
Sept.	45.2	9.3	17.8	65.2	92.3	137.5
Oct.	46.8	3.8	21.3	65.6	90.7	137.5
Nov.	43.3	4.4	20.2	82.1	106.7	150.0
Dec.	42.4	4.5	17.0	66.1	87.6	130.0
Total	553.5	101.9	206.6	753.0	1,061.5	1,615.0
1954						
Jan.	47.0	7.8	20.3	67.4	95.5	142.5
Feb.	46.9	....	17.5	70.6	88.1	135.0
Mar.	53.7	2.7	19.1	72.0	93.8	147.5
Apr.	51.4	15.5	19.7	68.4	103.6	155.0
May	51.4	1.1	18.8	66.2	86.1	137.5
June	54.2	3.6	18.0	64.1	85.7	140.0
July	37.9	0.8	17.7	68.6	87.1	125.0
Aug.	38.1	8.9	14.2	63.8	86.9	125.0
Sept.	52.4	11.5	19.3	71.8	102.6	155.0
Oct.	56.0	3.5	23.1	74.9	101.5	157.5
Nov.	53.3	2.3	19.2	75.2	96.7	150.0
Dec.	55.2	5.0	19.6	72.7	97.3	152.5
Total	597.5	62.7	226.5	835.7	1,124.9	1,725.0
1955						
Jan.	56.6	....	22.7	....	100.9	157.5
Feb.	51.0	....	19.5	....	91.5	142.5
Mar.	57.9	....	20.8	....	....	....

* Estimated.
Source: BDSA, United States Department of Commerce; Secretariat of the International Rubber Study Group; and United Baltic Corp., Ltd.

World Production of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	Germany*	Total
1950	476.2	58.4	....	534.6
1951	845.2	62.3	0.9	908.4
1952	798.6	74.3	4.9	877.8
1953	848.4	80.9	6.3	935.6
1954				
Jan.	57.3	7.3	0.4	65.0
Feb.	53.4	6.7	0.4	60.5
Mar.	55.8	7.4	0.5	63.7
Apr.	47.6	7.1	0.6	55.3
May	46.6	7.3	0.5	54.4
June	45.9	5.9	0.5	52.3
July	47.0	5.8	0.5	53.3
Aug.	48.8	7.3	0.7	56.8
Sept.	51.4	7.9	0.6	59.9
Oct.	55.6	8.0	0.6	64.2
Nov.	55.0	8.0	0.7	63.7
Dec.	58.5	7.9	0.9	67.3
Total	622.9	86.6	6.9	716.4
1955				
Jan.	69.9	8.1	....	....
Feb.	67.7	....	....	....
Mar.†	78.5	....	....	....

Source: Secretariat of the International Rubber Study Group; and BDSA, United States Department of Commerce.
* British Zone only from 1945 to 1947; Bizone for 1948 and 1949; Federal Republic since 1950.
† Preliminary.

World Consumption of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	United Kingdom	Total† Continent of Europe	World† Grand Total
1950	538.3	22.6	2.8	16.0	580.0
1951	758.9	26.4	3.9	22.3	812.5
1952	807.0	33.6	4.9	35.0	885.0
1953	784.8	35.9	4.9	39.3	872.5
1954					
Jan.	50.2	2.6	0.6	3.8	57.5
Feb.	49.1	3.0	0.5	4.0	57.5
Mar.	56.1	2.9	0.7	4.3	65.0
Apr.	53.6	2.7	0.8	4.0	62.5
May	52.6	2.7	0.7	4.0	60.0
June	57.2	2.8	0.7	4.3	67.5
July	41.5	1.9	0.6	4.3	50.0
Aug.	42.1	2.0	0.7	3.5	47.5
Sept.	53.9	2.4	0.8	4.5	62.5
Oct.	58.3	2.1	1.0	4.3	65.0
Nov.	57.3	2.6	0.8	4.5	65.0
Dec.	63.5	2.4	0.8	4.8	72.5
Total	635.4	30.1	8.7	50.3	735.0
1955					
Jan.	66.8	2.6	1.2	....	77.5
Feb.	66.3	....	....	....	....
Mar.‡	75.9	....	....	....	....

Source: Secretariat of the International Rubber Study Group; BDSA, United States Department of Commerce.
* Includes latices.
† Figures estimated or partly estimated.
‡ Preliminary.

U.S.A. Rubber Industry Sales and Inventories

(Million of Dollars)

	Value of Sales*				Manufacturers' Inventories*			
	1952	1953	1954	1955	1952	1953	1954	1955
Jan.	408	424	348	405	809	866	844	798
Feb.	402	435	351	....	842	868	857	....
Mar.	400	473	388	....	857	880	849	....
Apr.	407	444	375	....	850	874	812	....
May	402	422	357	....	855	888	810	....
June	409	436	377	....	851	914	829	....
July	377	448	374	....	890	925	784	....
Aug.	388	409	337	....	877	897	761	....
Sept.	427	416	334	....	871	908	804	....
Oct.	423	395	332	....	866	881	838	....
Nov.	383	346	388	....	850	867	819	....
Dec.	418	369	407	....	877	868	929	....
Total	4,844	5,017	4,368	....	Av. 858	853	831	....

* Adjusted for seasonal variation.
Source: Office of Business Economics, United States Department of Commerce.

MACHINERY AND SUPPLIES FOR SALE—Continued

FOR SALE: 1—NATIONAL-ERIE 8½" STRAINER; 1—ERIE 22" x 60" mill, M.D.; 1—HPM hydro-pneumatic accumulator 200-3100#; 1—lab combination 6' x 12' mill and calender unit; also presses, mixers, vulcanizers, etc. CHEMICAL & PROCESS MACHINERY CORP., 146 Grand Street, New York 13, N. Y.

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(Thousands of Pounds)

	Cotton				Rayon				
	Tire Cord Not Woven	Tire Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord and Other Tire Fabrics	Total	Nylon Tire Cord and Fabrics	Total* Synthetic Tire Cord and Fabrics
1952									
Jan.-Mar.	11,226	36,378	12,971	60,575	14,434	72,249	86,683	1,291	87,974
Apr.-June	4,661	24,612	10,742	40,015	16,874	81,249	98,123	1,463	99,586
July-Sept.	335	9,257	9,460	19,052	18,128	80,355	98,483	2,567	101,050
Oct.-Dec.	†	4,587	11,787	16,374	19,436	81,171	100,607	2,761	103,368
Total	15,887	74,834	48,280	139,001	68,873	315,024	383,897	8,082	391,979
1953									
Jan.-Mar.	‡	4,378	15,878	20,256	20,487	91,742	112,229	4,074	116,303
Apr.-June	‡	5,713	16,383	22,096	18,906	95,711	114,617	4,128	118,745
July-Sept.	‡	3,562	13,273	16,835	18,597	89,821	108,418	5,402	113,820
Oct.-Dec.	‡	2,460	11,569	14,029	19,664	74,013	93,677	5,246	98,923
Total	‡	16,113	57,103	73,216	77,654	351,287	428,941	18,850	447,791
1954									
Jan.-Mar.	‡	2,585	13,229	15,814	17,297	73,068	90,365	5,320	95,685
Apr.-June	‡	4,067	12,830	16,897	12,436	66,796	79,232	8,357	87,589
July-Sept.	‡	2,104	9,321	11,425	12,851	50,136	62,987	6,754	69,741
Oct.-Dec.	‡	3,743	12,476	16,219	14,609	76,931	91,540	9,338	100,878
Total	‡	12,499	47,856	60,355	57,193	266,931	324,124	29,769	353,893

* Fuel cell fabrics not included with rayon and nylon tire cord and fabrics.
† Included with "Chafer and All Other Tire Fabrics" to avoid disclosing data for individual mills.
‡ Included with "Tire Cord Fabric Woven" to avoid disclosing data for individual mills.
Source: Bureau of the Census, United States Department of Commerce.

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(*Continued from page 399*)

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Bisonides

(*Continued from page 392*)

of Bisonides are given below:

	Bisonide #400	Bisonide #1600	Bisonide #1630 (Oil Extended)
Form supplied....	Slab or powder	Slab or powder	Slab
Mooney plasticity, ML 212 5-1	40-75	75-125	30-40
Specific gravity ..	1.15	1.20	1.17
Rubber hydrocarbon, %........	48-50	45-50	37-40*
Acetone extract, %	20	25	35
Suggested uses ..	All purpose	Oil-resistant compounds	Oil-resistant sponge; low-temperature stocks; low-price mechanical goods

* Oil-extended types are treated as if the rubbery hydrocarbon were 50%.

A technical bulletin, MD-1, dated April, 1955, may be obtained from the company and includes more detailed information on compounding, vulcanization, oil extension, and suggested formulations.

Rubber Adhesive for Paper—Glutak

A rubber-based liquid adhesive for bonding paper to such materials as wood, glass, metal, acetates, plastics, tile, and leather has been placed on the market by Glutex, Inc., Brooklyn, N. Y. Called Glutak, the adhesive is said to be instant-drying, pressure-sensitive, non-flammable and non-toxic. The product comes in one- and three-ounce collapsible metal tubes with ball valve applicators on their tips.

June

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